VOLUME 70 (W. B. No. 1078) NUMBER 11

DEPARTMENT OF COMMERCE
Jesse Jones, Secretary
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MONTHLY WEATHER REVIEW

NOVEMBER 1942

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CORRECTIONS

MONTHLY WEATHER REVIEW, October 1942, vol. 70: Page 244, Columbia, Mo. [Missouri Valley section], date of highest temperature, "7" should be "9"; Rapid City [Northern Slope section], the mean cloudiness, "4.8" should be "4.9"; page 246, table 1, all data for Blue Hill, Mass., should be deleted pending the establishment of a new correction factor for that station.

MONTHLY WEATHER REVIEW

Editor, EDGAR W. WOOLARD

VOL. 70, No. 11
W. B. No. 1375

NOVEMBER 1942

CLOSED JANUARY 2, 1943
ISSUED JANUARY 31, 1943

THE CLASSIFICATION OF CLIMATES[1]

BY ALFONSO CONTRERAS ARIAS

FOREWORD BY LOIS OLSON

The establishment of the Bureau of Geography, Meteorology, and Hydrology within the Department of Agriculture in Mexico initiated a period of rapid progress in climatologic research directed specifically toward the service of agriculture. To a large extent this great modern movement is due to the efforts of one man, Alfonso Contreras Arias. Beginning with the problem of climatic classification, he has branched out into other phases of applied climatology, but all of this subsequent work has been fitted into the framework of climatic types.

Contreras began by introducing Mexican climatologists and agricultural workers to the broader aspects of climatic classification. This was followed by objective discussions of the three systems of climatic classifications that have received world recognition—those of Köppen, de Martonne, and Thornthwaite.[2] The final article of the series contains Contreras' own views on the question of climatic classification. Because he has stated extremly well the limitations of all existing classifications and has indicated the direction that must be followed if improvements are to be made, the entire article has been translated in order to make it available to climatologists in this country.

In the previous articles, an effort was made to explain the climatic classifications of Köppen, de Martonne, and Thornthwaite. These three are actually the only systems of classification that have received universal recognition and have been used widely in both general sources and included climatic descriptions in various published works on geography, ecology, economics, etc., throughout the part of this century already past.

It now seems appropriate to analyze briefly the problem of climatic classification in general, and specifically in relation to these three systems. The Köppen system, which initiated a new era in climatology, as has already been said, was used in all the earlier serious works of modern geography, notably in those describing various regions of the world. That of de Martonne—especially the application of his "index of aridity"—has been used generally for descriptive purposes until recently, when the Thornthwaite system gained favor so rapidly that it is used almost exclusively in recently published foreign works on geography, ecology, and agricultural economy.

Naturally, as a system of classification advances farther into the field of science, attacking the problem of quantitative measurement (preeminently the goal of all scientific disciplines) the methods of classification become complex through the use of formulae and concepts that are more or less complicated for the average man. Although actually preferred by men of science, the application of the final method, of necessity, lacks the popularity accorded its predecessors because it requires specialized training. In our country it is the system of de Martonne—modified several times in different ways—that has been applied most widely, and the terminology employed by that author to designate climatic types is found in geography texts and in the writings in other fields related to climate. According to our belief and for reasons that will be explained later, it is the least satisfactory of the three systems for showing the relation between the different regions of our country and the rest of the world—which is the goal persistently sought after.

Classification implies not only the differentiation between two or more objects or phenomena but also, after the whole has been divided into established groups or classes, the coordination of these classes into a scheme that shows their origin or relationship. To say that the climate of our "Bajío" region is different from that of the "Corn Belt" of the United States is only one step; it is necessary thereafter to state the nature and degree of the differences between the two, in relation to accepted criteria, in order that we may describe on this basis, for example, their relative habitability for man. If, on the other hand, we simply call the climate of the central plateau of Mexico the "Mexican climate" or that of the Gulf of Guinea, the "Guinea climate," we will in reality be ignoring the fundamental problem even if we subsequently describe each climate in detail. A simple description of a climate in terms of meteorological data cannot lead to conclusions regarding its potentialities for agriculture, forestry, settlement, etc.

According to the system of de Martonne, only where reference is made to the limitations on available moisture by means of the "index of aridity" is anything resembling classification established. But neither in the general scheme of classification nor in the fundamental bases for the system can a definite explanation of this factor be found (especially as far as temperature is concerned) except, by chance, in a vague way. On the other hand, the systems of Köppen and Thornthwaite, beginning with the concept of favorability for plant life, differentiate clearly between different types of climate on a numerical scale.

Climatic types may be established either in relation to a climatological element which is considered most important or in relation to the effects already imposed by climate on plants, animals, or soil. On this basis a distinction might be made between "pure" climatology and "applied" climatology.

But a sytem of classification that is limited strictly to the field of pure climatology, that is, one in which all relations between climate and the resulting edaphic and ecological phenomena are excluded for the division of climate into types, would be absolutely artificial and valueless, since it would be based solely on arbitrary series of physical data. Actually there has been no system of this type. Theoretically, at least, the many systems of climatic classification that have been developed during the passage of time have sought out and attempted to exploit the relations that exist between the distribution of various elements of climate and other phenomena. In the first climatological zonation of the earth by Supan, the annual isotherm of 20° C. and that of 10° C. for the warmest month of the year were selected as boundaries between the hot, the temperate, and the cold zones corresponding to the general distribution of plant life. If any single criterion can be accepted as the most general, it is favorability for plant growth.

[1] Translated by Lois Olson from *Agricultura*, vol. 2, No. 14, pp. 17-24, 1939.
[2] Contreras Arias, Alfonso. "La clasificación de los climas," *Agricultura*, vol. 1, No. 1, pp. 16-18, 1937; "La clasificación según Köppen," *Agricultura*, vol. 1, No. 2, pp. 6-13, 1937; "La clasificación según de Martonne," *Agricultura*, vol. 1, No. 4, pp. 34-42, 1938; "La clasificación según Thornthwaite," *Agricultura*, vol. 1, No. 6, pp. 8-12, 1938.

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The selection of the existing state of the soil, as a basis for determining climatic classes or types, offers many very serious difficulties. Among others are those derived from the mutual relation between the climate and soil and the lag in the response of the latter to climatic forces in its process of evolution. On the other hand, animal life, especially human life, while basically controlled by the forces as a whole, is removed to a large extent from the influence of climate in many ways, thus making highly complex the problem of determining the direct effects of climate. However, authors of systems of climatic classification have claimed, explicitly or implicitly, that their climatic types correspond with the types of natural vegetation that predominate in the corresponding geographical regions. This is the source of expressions such as steppe climate, desert climate, taiga, etc.

Carrying this idea to an extreme, it might be concluded that the climatological conditions peculiar to each region, as related to favorability for plant life, might be best expressed by the very existence of different plant types, without requiring the expression of these conditions through meteorological data. The different types of climate would be characterized on the basis of different types of plants. Raunkiaer, the Danish botanist, has attempted a classification of this nature.

The fundamental basis of this classification is the nature and degree of protection that the plant displays during the unfavorable season in its terminal buds, lateral buds, shoots, or other organs destined to continue its life on the return of a favorable season. During the season that is unfavorable—because of either temperature deficiency or insufficient moisture—this vegetative organ remains in a state of dormancy, ready to resume active growth when the combination of climatic factors again becomes propitious.

The 10 types or forms of plant growth distinguished are shown below (the symbol used for designating each is enclosed in parentheses):

1. Succulent stem (S). Stems fleshy or juicy.
2. Epiphytes (E).
3. Megaphanerophytes and mesophanerophytes (MM). The megaphanerophytes are trees more than 30 meters tall, whereas mesophanerophytes are trees 8 to 30 meters in height. As the terminal buds of both are freely exposed the two types are considered together.
4. Microphanerophytes (M). These are small trees or shrubs with heights of between 2 and 8 meters.
5. Nanophanerophytes (N). Shrubs of less than 2 meters in height. (The trees and shrubs can be designated jointly as phanerophytes.)
6. Chamaephytes (Ch). These are plants that have their terminal buds situated at the surface of the soil or just above it, in such a manner that in regions where it snows they are protected by snow in winter and in regions where drought is the unfavorable factor the dried-out parts of the plants, which have died down to the soil, provide some additional protection. Thus the buds are better protected than among the phanerophytes. Creeping plants and "cushion plants" belong to this group.
7. Hemicryptophytes (H). These plants have dormant buds just below the surface of the soil, and upon the death of the part exposed to the air, the herbaceous part, in the unfavorable season remains in a dry state above the soil, providing additional protective covering.
8. Geophytes (G). In these the part of the plant that can remain dormant is subterranean. They are plants with bulbs, rhizomes, etc.
9. Helophytes and hydrophytes (HH). The former are swamp plants, with their terminal buds at the bottom of the water or in the soil just below. Hydrophytes are aquatic plants with rhizomes.[1]
10. Therophytes (Th). These are plants that do not remain alive after the onset of the unfavorable season, except for the seed; that is to say, the plants are annuals. The geophytes, helophytes, and hydrophytes.

[1] In ecology and plant geography, the term "hydrophytes" ordinarily has a broader meaning than that assigned to it by Raunkiaer. They are plants normally requiring great humidity, even though they do not specifically live in water.

Even though this author has practically ignored the lower forms of plant life (algae, fungi, etc.) his system is of considerable interest. Outside of the two first groups (plants with succulent stems and the epiphytes) with definitely characteristic peculiarities, the remaining groups, beginning with the phanerophytes, form a series in which each vegetal type has its terminal buds better protected than those of the preceding group.

In order to determine the favorability of the climate of a region according to Raunkiaer's system, a list must be made of the different species of plants occurring within it. After classifying these according to the groups mentioned above, the percentage belonging to each group must be calculated. For a given region, the term "biological spectrum" is applied to the table of values arranged in conformity with the vegetative groups already mentioned. This spectrum will be compared with the normal spectrum, which is assumed to represent average conditions for the world as a whole.

The normal spectrum, according to Raunkiaer, is as follows:

S.	E.	MM.	M.	N.	Ch.	H.	G.	HH.	Th.
1	3	6	17	20	9	27	3	1	13

If a local spectrum, for example, shows a predominant percentage of type H (Hemicriptophytes) in comparison with the normal spectrum, the climate of the locality will be termed "hemicriptophytic"; if in another the percentage of groups G and HH in the spectrum is markedly higher than in the normal spectrum, the climate will be termed "criptophytic," etc. The climate which, through dryness, for example, supports only annuals would be "therophytic" in the extreme.

Theoretically this method is above reproach on an ecological basis, provided this is the accepted approach to the problem, since the classification is based on degree of climatic favorability. In application, it is not satisfactory for some parts of the earth because of the inadequacy of our knowledge of geographical botany. It presupposes minutely detailed knowledge of the flora of each place, which is not available in the majority of cases; nor is it to be anticipated that this detailed knowledge can be obtained quickly, considering the arduous labor that it entails. From the climatological viewpoint it does not fulfill the purpose of a system of classification, which is to make possible ready comparison of the climate of certain regions with that of others by means of a fixed scale of values—preferably numerical—that permits direct study not only of the effects of climate on the vegetation but also upon animals, soil, etc. For this reason, among others, Raunkiaer's system has not been widely employed up to the present.

Of the systems of Köppen, de Martonne, and Thornthwaite, that of Thornthwaite has the additional advantage of attacking the concept of favorability for plant life by using a numerical method for expressing the degree of favorability in respect to both thermic and hygrometric conditions, thus establishing two scales of progressive values which seem in accord with the characteristic progression in nature. Moreover, the four elements or factors used to define each climate (humidity, temperature, distribution of rainfall throughout the year, and the yearly temperature variations) are presented clearly, showing the importance and scope of each of these and permitting rapid improvement leading towards ultimate perfection, either quantitatively or through an increase in the number of groups or types recognized.

The basic factors of *all climate* are these four, and Thornthwaite's merit consists essentially in his having devised a simple and rational method for classifying them.

But let us not exaggerate the possibilities of this system. Climate is unique because, in the first place, it helps us differentiate between one region and another of the earth's surface and is a very complex combination of characteristics. It is this circumstance that gives an impression of an almost infinite diversity of climates. Aside from those we have already mentioned, there are other very significant characteristics that have not been considered in the scale of classification we are discussing.

One of these is the magnitude of the diurnal range of temperature, which in the technical terminology of climatology is called simply the daily range or oscillation in temperature. Or it may be described as the difference occurring within a 24-hour period between the highest temperature (usually registered in the early afternoon) and the lowest temperature (commonly registered about dawn). This variation is of major importance to plant life and is unrelated to the annual march of temperature. I might add that there are climates in which the diurnal range is very great although yearly temperature variation (judged on the basis of noonday or average monthly temperatures) is so small that thermic seasons cannot be distinguished. This occurs within the Tropics, especially in dry regions. In humid regions the clouds, and even the water vapor in the lower layers of the atmosphere, reduce notably the variations in temperature. But in dry regions, in which the nights generally have clear skies, the loss of heat by the soil and by the adjacent air is extremely rapid, with results of great importance. In the first place rapid cooling is a hazard to plant life, even killing it in the case of black frost. It has been proved that without noticeable injury plants resist changes of temperature much greater than that registered during frosts, provided these changes occur slowly. However, what seems to be most damaging to plants is the rapid rise of temperature following a night which is very cold after sunset.

Aside from this direct effect of the diurnal range of temperature, the condensation of the vapor in the atmosphere caused by nocturnal cooling must be considered. If the atmosphere is not extremely dry, as the temperature of the air becomes lower, the water vapor reaches the temperature required for condensation, which takes place in the form of dew if the temperature is above 0° C. This is a very frequent occurrence during the winter throughout the Tropics even in high altitudes. The soil and plants in this way receive unrecorded moisture, which sometimes is considerable. As a result, some regions that seem to be extremely dry, on the basis of amount of precipitation received, are not in reality so dry and can support plant life that would perish if it depended upon rainfall alone.

The manner in which the rain falls is another factor that affects the amount of moisture in a given area. This is not considered if the data available are based solely on the amount of water recorded by a raingage. A violent storm does not have the same effectiveness as a long continued gentle rain, even though the total amount of water received might be the same in both cases. Precipitation in the form of snow also behaves differently. A gentle rain provides the maximum amount of available water in the area in which it falls and a minimum amount of run-off to other areas. The opposite is true of a heavy storm; and this not only reduces its value in the area where it falls but also converts it into a serious agent of destruction for the delicate parts of plants and the vegetative cover of the soil.

From the standpoint of plant life another important difference between regions of the earth's surface is the intensity and distribution of solar radiation through time. As climate is defined meteorologically, considering only the characteristics of the atmospehere, solar radiation is not taken into account except as a factor upon which the temperature of the air depends. It is not considered in relation to its direct effects on soil, plants, animals, etc. In the general concept of climate, however, this factor is usually included. Thus, for example, it is included when the factors that comprise the climate of one or another region are mentioned in relation to the curing of certain ailments through the direct action of sunshine. In climatological tables, data concerning the number of hours of bright sunshine and the intensity of solar radiation itself are ordinarily included.

For a plant whose nourishment depends upon photosynthesis, which is generated through energy received directly from the sun, not only the total amount of energy that it receives during its life cycle but also the manner in which solar radiation is distributed through time is of major importance. In this connection there is a marked difference between conditions in the intertropical zone and those of higher latitudes. The length of the solar day in the Tropics varies but slightly during the year, while in higher latitudes, even if we consider only those known as the "middle latitudes" (35° to 50° in the Northern and 30° to 40° in the Southern Hemisphere) this variation is marked. During the season of heading and ripening of annuals such as the cereals, the radiation received in the Tropics is very intense but is limited by comparatively short days; in the middle latitudes, however, the radiation is less intense per minute but continues during a greater number of hours per day. The effects of this difference in the distribution of solar energy on the anatomy and physiology of plants, however, has not been studied adequately; but everything indicates that it is principally responsible for the differences encountered in the hardiness and composition of the grain when the same variety is cultivated under otherwise similar conditions in inter- and extra-tropical regions.

Although we have mentioned daily variation in temperature, moisture, and solar radiation, it seems that, aside from the different variations in temperature throughout the year, there are other important differences between climates which through quantitative measurement would be of use in a system of climatic classification. Unfortunately, in none of the three systems mentioned are these elements employed, nor do they appear in any other that is known. De Martonne, in describing the characteristics of intertropical types (which in his general scheme of classification are included in the group of "hot climates"), refers to the daily range of temperature but without presenting any method for quantitative measurement or even for formulating an opinion about its relative importance.

Authors, adhering firmly to the meteorological definition of climate, do not refer to the intensity and distribution of solar radiation, leaving these factors for consideration in special studies.

There is also another climatological factor of great importance which, to date, has not been taken into consideration in a general classification of climates—namely, variability. The group of factors considered representative of a region describes conditions which occur over a period of many years, those which have been represented most frequently in the region. However, in any selected year, actual conditions diverge more or less from this representative climatological type.

It would be of no great importance if the divergence from the normal type were small (with negligible effect on plant life, for example) or of more or less the same magnitude

in different parts of the world. But there are great contrasts in this respect which begin to emerge as soon as a practical expression is given through the climatographic isolation of any part of the earth's surface. From the agricultural viewpoint, for example, climatic variability is one of the factors that should be considered of primary importance in estimating the potentialities of a region. The variation in the yield of a cultivated plant from year to year is subject more to the meteorological conditions that occur during its growth than to any other factor. Man, striving to improve his living conditions to the best of his ability, has been obsessed with the idea of crossing and selecting in order to produce varieties especially resistant to the adversities most frequently encountered in each region. In those regions where the same type of adversity occurs from year to year, the variety that is distinguished by its resistance to it is best acclimated and of greatest value because of its productivity. By contrast, in places where the hazard varies from one year to the next (or from some years to others), having, for example, insufficient moisture at some times and excessive moisture at others, the prospects of improving any variety of plant are much smaller, and the yields vary greatly from one year to another.

In cases where the climate of a region is expressed numerically, as through the Thornthwaite indices, one method that at first glance seems capable of avoiding this pitfall would perhaps be the indication along with the value of each index number of another value such as "average deviation," "typical quadratic deviation" (or "standard deviation"), "total range of variation," etc., using statistical methods to qualify the distribution or variability of a series. But the problem, considered from the viewpoint of plant life, is not so simple because there is no guarantee that the magnitude of the meteorological variations used is in proportion to the resulting effect on plant life.

Finally, just as the concept of climate in relation to time implies the idea of persistence, so in relation to space it implies the idea of definite, limited extent. When we consider climate we inevitably associate the idea of a definite combination of factors with a specific area more or less extensive; in this way we say the "climate of the coastal region," the "climate of this part of the plain," the "climate of that valley," "the climate of this city . . ." Recently the term "climate" has been applied to a combination of certain factors that are limited to an area of very small extent, and thus a specialized branch of research has been created—microclimatology. Microclimate, according to Geiger, is interpreted as the climate of an infinitely small area.

According to our ideas, this undue extension of the concept of climate is only one of those extremes induced by the exaggerated spirit of generalization that is frequently encountered among certain scientists. To speak of the climate of an infinitely small space seems simply absurd.

But in all cases there is the problem of qualifying the degree of precision so that the type of climate recognized as representative of a geographical region satisfies the climatological factors that can be distinguished within it. Let us consider the simplest case, such as that of an extensive plain where representative statistical data and the general factors of the climatic regime (such as "average annual temperature," "the annual distribution of rainfall," and "the annual march of temperature") are approximately the same for all points. Even in such a region some places will differ from others because of different soil composition, or because of differences between eroded soil and soil covered with a mantle of vegetation, etc. These differences are responsible for phenomena that may be of great importance locally, especially for plant and animal life. The most important of these phenomena are, certainly, those arising from the different rates of heating and cooling of the lower layers of the atmosphere from place to place during the day. The "daily range of temperature" of the layer of air next to the soil cannot be shown in a regional type of climate even though it probably has greater local significance than any other factor.

In reality, the problem is far more complicated since the areas regarded as geographic units in works of climatography do not have the uniformity assumed in our example; but within them are to be found topographic unconformities that cause deviations from the general climatic type of the region. Consider now the results of difference in exposure to the rays of the sun, as demonstrated by the slopes of a single hill; the variations derived from the orientation of a ravine or the character of a valley; and finally, the effects produced by the nearness to woods, a lake, a city, etc.

In view of the great complexity of the question, doubtless it is evident that there is reason to undertake at least three distinct types of study: That concerned with the climatic character of the geographic region; that concerned with topographic diversities; and that concerned with local differences arising from the specific nature of the soil, its vegetative cover, etc. Consequently, three terms have been suggested to designate the climatological purport of each type of study: Macroclimate, mesoclimate, and microclimate. *The relative importance of macro-, meso-, and micro-climatology depends upon the practical purpose for which each is destined.* The geographer and, to some extent, the economist usually undertake macroclimatic studies. For the farmer, the ecologist, and soil scientist, meso- and micro-climatic phenomena are of greater importance.

What boundaries can be drawn between macro-, meso-, and micro-climatology? It is an open question, and the few works published to date comprise a medley of widely diverse concepts, so much so that it is difficult in some cases to see clearly the fundamental ideas of the authors.

The limits between concepts of macro-, meso-, and micro-climate, with reference simply to areal extent of land over which a climatic type is valid, as proposed by Scaëtta, remain supremely vague. Geiger and Schmidt suggest that the distinction between meso-, and microclimate be made on the basis of instrumental technique. When the phenomenon to be studied requires special placing of thermometers, differing from that used in ordinary meteorological observatories, the phenomenon would be of a microclimatic nature. For example, a study of cooling like that experienced in the layers of air near the ground requires the exposure of themometers at specified elevations above the soil, in addition to the usual meteorological shelter. This investigation would be microclimatological; as also would be those studies requiring, for example, the use of a thermometer of great sensitivity (e. g., thermoelectric), or the use of a hot wire anemometer in place of an ordinary anemometer for measuring the movement of the air. Finally, according to Remp, it is degree of persistence or immutability that distinguishes the three types of climate. Variability of climate increases as the space considered is restricted. Regional or macroclimate, which is determined by geographical position, including general orographic features (altitude, situation in relation to a mountain range, etc.), has the highest degree of stability. Mesoclimate is less stable since it lies within a macroclimate and since it is deter-

mined by topographic features of the earth or by the influence of large areas with different land conditions, such as extensive woods, swamps, the buildings of a large city, etc. At times it can even be modified artificially: A swamp can be drained, the exposure of a slope may be improved by proper terracing, a valley or ravine may acquire protection through the growth of woods, a city may expand greatly, etc. In the case of microclimates, the climates are essentially lacking in stability since they depend on purely local features, among which minor details of topography, of the evolution of a natural vegetation cover, of the activities of farmers, etc., play an important role.

We do not pretend to make even a more or less complete review of the various aspects of this question. Such a procedure would be beyond the purpose and scope of these articles. However, we believe that what has been said is enough to indicate the great difference that exists between the different climatic characteristics of a given area. Certain individual characteristics may be classified as macroclimatic, mesoclimatic, and microclimatic, and the distinction has much greater transcendency than appears at first. But even if mesoclimate is subordinate to macroclimate, and microclimate in its turn to mesoclimate or to macroclimate directly, the validity of the climatic data, the techniques that should be used in securing them, and the use that may be made of them depend upon an understanding of current geographic, topographic, and local site factors upon which they depend.

For example, the intensity and frequency of frost, although of great importance to the farmer, are of a microclimatic order or at least mesoclimatic. Anyone who has observed this phenomenon in the fields knows that because of minor topographic variations there are often great differences between one area and the next: the sinking of cold air, the local mobility of the lowest layers of the atmosphere, the humidity of the layer of air in direct contact with the soil, etc., at the exact moment when cooling takes place. Even within a single farm of moderate size, the farmer knows that some places are more subject to frosts than others. From this it is clear that on a general map of a country as fitful as ours, on a scale in which not even major topographic features are perceptible, the demarcation of areas of real value to practical farmers, for example, could not even be attempted.

The records of wind direction and velocity that are made at many of our observatories are also elements whose use requires much interpretation since, considering the low elevation above the soil at which our wind vanes and anemometers normally have to be installed, their records are of mesoclimatic order. Consequently, even though they show the actual movement of the air in a locality, their records may not conform—especially as far as direction is concerned—with the movements of the great masses of air that invade the Republic and upon which, climatologically speaking, the various phenomena that characterize the seasons depend.

The systems of classification used up to the present are of macroclimatic type. Possibly to distinguish between mesoclimates and microclimates, other methods, using totally different elements, may be needed. As the factors that should be considered as fundamental become more restricted areally, the criterion for judging the methods, the units, and the data would differ radically, at least in the case of microclimates. In these we decide individually what information is *indispensable* to accomplish the practical purpose for which the study was designed (phytoecology, zooecology, edaphology).

The system of Thornthwaite, although devoted like the others to the differentiation of macroclimates, has advantages because the macroclimates are derived directly from that concept which, as we have already said, serves both as a starting point (favorability for plant life) and as a method of classification through progression of values. From this it becomes evident that the system might be extended to include the description of mesoclimates by means of modifications and amplifications which do not effect substantially its fundamental principles.

From what we have said, it will be understood that the actual application of the general methods of climatic classification cannot do more than delineate the macroclimatic regions of a country. To complete the climatological description it is necessary to describe with more or less detail the characteristic mesoclimatic features in the different parts of each of the macroclimates or at least to point out those factors that create such variations. As for microclimatic features, their study belongs obviously to applied climatology and for this reason remains subject to the purpose and criterion of the investigator in each individual case.

The territory of the Mexican Republic has characteristics that are truly unique from a climatological standpoint: Its geographical position, to a large extent tropical; its orographic diversity; to the south of the volcanic range, its position as an isthmus between two seas with different conditions of temperature and ocean currents; its proximity to a tropical cyclonic region as important as that of the Antilles. All these factors, working together, create sharp climatic contrasts within the country and make its climatic division extremely difficult. It is necessary, therefore, to bear in mind the ideas that have been propounded in this brief paper not only in constructing a climatic map but more especially in using such a map as a basis for drawing conclusions for application in other investigations. This is particularly important when the nature of an investigation undertaken requires the evaluation of the relative importance of various types of climatic data.

Since the Thornthwaite system of climatic classification seems to be in reality the most convenient, as much because of its intrinsic qualities as because of its general acceptance throughout the world, we have constructed in the Institute of Geography of the Secretariat of Agriculture and Development a new climatic map based on this system. This has been entitled "Map of the Climatic Provinces of the Mexican Republic" and is actually in press.[4] The macroclimatic nature of the study is shown by the title and in the accompanying text we have tried to show the major mesoclimatic factors that can be distinguished in each province. We propose, furthermore, to study later the microclimatic subdivisions of each of these.

The new map, however, differs from the part of Thornthwaite's world map [5] that relates to our country and upon which our plan is based, because all currently published data have been used as well as Thornthwaite's fourth element of classification (the annual march of temperature) in arriving at the cartographic divisions. This latter is an element that even Dr. Thornthwaite himself has been unable to show on his map—because of cartographic difficulties, as he explains in his text—but also an element of greatest importance for the climatic divisions of the country.

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[4] This map, on the scale of 1:5,000,000, was recently published by the Secretaría de Agricultura y Fomento in a bulletin entitled *Mapa de las Provincias Climatológicas de la República Mexicana* (Mexico, D. F., 1942) and is accompanied by an explanation of its construction and by a comprehensive series of climatological tables giving the data upon which the map is based.

[5] See Agricultura vol., No. 6, pp. 8-12, 1938.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR NOVEMBER 1942

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during November 1942*

Stations and elevations in meters above sea level

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,620 m.)				Apalachicola, Fla. (8 m.)				Atlanta, Ga. (300 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho (868 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	838	9.7	35	30	1,019	16.7	77	30	986	9.8	72	28	954	−2.2	77	30	916	3.8	77	30	1,016	19.0	84	29	990	3.7	79
500					30	961	16.4	65	30	963	11.8	65									30	960	18.7	75	29	957	3.2	74
1,000					30	906	14.1	61	30	907	9.8	62	28	897	−0.8	73	30	902	4.9	71	30	906	16.3	68	29	899	0.7	74
1,500					30	854	12.2	56	30	854	8.1	59	28	842	−2.7	71	30	848	3.8	66	30	854	14.4	63	29	845	−1.3	70
2,000	30	801	10.0	36	30	804	10.5	49	30	803	7.3	55	28	790	−4.4	67	30	797	1.0	65	30	804	12.9	53	29	793	−3.4	67
2,500	30	754	7.2	36	30	757	8.9	39	30	756	5.7	49	28	741	−6.6	62	30	749	−1.8	63	30	758	10.7	48	29	744	−5.7	66
3,000	30	709	4.2	37	30	713	7.0	34	30	711	3.8	46	28	695	−9.2	61	30	703	−4.8	63	30	714	8.1	46	29	698	−7.8	66
4,000	30	626	−2.0	39	29	631	2.2	30	30	628	−1.0	42	28	610	−15.5	59	30	618	−10.9	63	30	632	2.7	42	28	613	−12.1	59
5,000	29	551	−7.8	39	29	556	−4.1	28	29	554	−6.9	39	26	534	−21.6	59	29	542	−16.7	60	30	558	−2.6	38	27	537	−17.9	52
6,000	29	484	−13.5	36	28	489	−11.1	28	28	486	−13.8	36	25	465	−28.1	59	29	474	−22.9	58	30	491	−8.9	35	27	470	−23.9	50
7,000	29	424	−20.7	35	28	429	−18.3	27	27	425	−21.4	33	25	403	−34.6	58	29	413	−29.3	56	30	430	−16.3	32	25	408	−30.3	48
8,000	29	370	−28.5	35	28	374	−26.0	27	26	370	−29.2	31	21	348	−40.9		29	358	−35.6	55	30	376	−23.8	31	25	354	−36.9	48
9,000	28	320	−36.5	35	28	325	−33.5	26	25	321	−36.4	31	19	300	−46.9		29	309	−42.2		30	327	−31.1	31	20	306	−43.2	
10,000	28	277	−44.1		27	282	−41.1		24	278	−43.8		18	257	−52.4		25	266	−48.5		30	284	−38.4	30	18	263	−48.3	
11,000	25	238	−51.4		27	242	−48.4		24	238	−50.7		16	220	−55.9		24	228	−54.3		30	244	−45.9		16	226	−52.5	
12,000	22	201	−57.0		26	208	−55.5		23	204	−56.4		13	188	−58.6		23	195	−57.8		30	210	−53.0		12	193	−56.0	
13,000	19	174	−61.0		25	177	−61.8		22	174	−60.6		12	159	−58.8		20	166	−59.4		30	179	−58.7		11	164	−56.0	
14,000	19	147	−63.5		23	150	−66.8		17	148	−63.7		11	135	−58.2		18	142	−59.5		28	152	−64.0		11	139	−56.7	
15,000	17	125	−66.5		21	127	−72.1		15	125	−66.5		10	115	−58.5		17	121	−60.5		28	129	−68.3		9	118	−58.5	
16,000	15	106	−69.0		20	107	−77.2		14	107	−69.3		7	98	−59.0		13	102	−61.2		27	109	−72.8		7	100	−60.0	
17,000	12	89	−70.3		17	90	−80.2		9	90	−70.0						12	87	−62.2		23	92	−74.8		6	85	−60.9	
18,000	11	75	−70.5		16	75	−78.5		5	76	−69.5						7	74	−62.5		21	77	−73.8					
19,000	8	63	−69.5		11	63	−73.7														14	65	−71.0					
20,000	5	53			7	53	−67.8														5	55	−66.8					

Stations and elevations in meters above sea level

Altitude (meters) m. s. l.	Caribou, Maine (191 m.)				Charleston, S. C. (14 m.)				Denver, Colo. (1,616 m.)				Detroit, Mich. (217 m.)				El Paso, Tex. (1,193 m.)				Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,128)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	991	−2.5	81	30	1,019	12.6	85	30	836	1.7	62	27	991	2.9	81	29	883	13.1	41	30	809	0.0	70	30	883	0.2	64
500	30	953	−2.2	77	30	962	14.7	69					27	957	2.8	78												
1,000	30	895	−3.9	71	30	906	12.0	66					27	900	0.7	73												
1,500	30	840	−5.3	70	30	854	9.6	63					27	845	−0.7	66	29	852	14.7	38					30	842	0.1	64
2,000	30	788	−6.5	67	30	803	7.6	59	30	797	4.6	58	27	794	−2.7	60	29	802	12.3	37	30	801	1.6	66	30	791	−2.4	63
2,500	30	738	−8.3	64	30	756	6.3	50	30	750	2.9	52	27	745	−4.5	56	29	755	9.4	37	30	753	1.9	57	30	742	−5.5	64
3,000	30	692	−10.8	61	30	711	4.8	45	30	704	−0.1	50	27	699	−6.7	53	29	711	6.5	37	30	707	−1.0	55	30	696	−8.5	65
4,000	30	607	−15.4	56	28	628	−0.5	42	30	621	−7.1	47	27	614	−11.5	49	29	629	1.0	36	30	623	−6.3	51	30	612	−14.9	63
5,000	30	531	−21.2	56	27	554	−6.5	36	30	545	−13.0	45	27	539	−17.2	46	29	555	−5.0	31	30	548	−12.1	48	29	535	−21.4	62
6,000	30	463	−27.3	56	27	487	−13.2	35	30	478	−19.4	43	26	471	−23.1	46	29	487	−12.0	30	28	480	−19.1	45	29	467	−28.1	59
7,000	30	402	−33.7	55	26	426	−20.9	34	30	417	−26.7	42	24	410	−29.7	45	28	427	−19.3	29	28	419	−26.0	44	28	405	−35.3	57
8,000	30	348	−39.8	54	24	371	−28.5	34	30	362	−34.1	42	20	355	−36.6		26	372	−27.1	29	25	364	−33.2	43	28	350	−41.1	
9,000	29	300	−45.9		23	321	−35.9	34	29	312	−41.6		20	307	−43.4		26	323	−35.1	29	25	315	−40.5		28	302	−46.6	
10,000	28	257	−50.2		23	278	−43.3		28	269	−48.7		16	264	−50.1		25	280	−43.0		24	272	−47.9		28	259	−51.3	
11,000	28	221	−52.8		23	240	−50.6		28	230	−54.7		16	226	−55.9		25	240	−50.6		23	233	−55.2		28	222	−54.8	
12,000	26	189	−54.9		20	205	−56.6		28	197	−58.4		15	194	−58.5		25	206	−57.3		22	198	−61.0		27	190	−56.4	
13,000	24	161	−54.6		19	174	−60.3		25	168	−59.5		15	165	−58.8		25	175	−61.2		21	169	−62.9		26	162	−56.8	
14,000	21	137	−54.5		18	148	−63.2		23	143	−60.3		13	140	−59.9		25	149	−64.1		19	143	−63.5		24	139	−57.3	
15,000	17	117	−55.2		16	126	−67.0		20	121	−61.4		11	120	−60.8		25	126	−67.4		19	121	−64.9		21	118	−57.5	
16,000	13	99	−56.3		14	106	−70.8		20	103	−63.5		9	102	−63.5		23	107	−69.8		18	103	−66.6		19	101	−58.1	
17,000	9	84	−56.2		8	90	−72.3		14	87	−64.1		6	86	−62.2		22	91	−70.6		13	86	−66.8		15	86	−58.2	
18,000	6	71	−55.6		8	76	−70.8		10	74	−62.7						17	76	−70.3						13	73	−58.1	
19,000					7	64	−68.2										12	64	−69.0						7	62	−58.1	
20,000																	5	54	−67.8									

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during November 1942*—Continued

Altitude (meters) m. s. l.	Huntington, W. Va. (172 m.)				International Falls, Minn. (343 m.)				Joliet, Ill. (178 m.)				Lake Charles, La. (5 m.)				(1) Lakehurst, N. J. (39 m.)				Medford, Oreg. (409 m.)				Miami, Fla. (4 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
	Stations and elevations in meters above sea level																											
Surface	29	999	6.6	78	30	972	−5.0	81	30	995	4.0	83	29	1018	15.0	88	20	1013	5.6	76	30	969	7.0	87	30	1017	20.6	81
500	29	960	7.2	76	30	953	−5.1	81	30	956	3.5	81	29	961	16.2	74	20	957	4.8	58	30	958	6.9	85	30	961	20.2	78
1,000	29	903	5.2	73	30	894	−5.9	79	30	899	2.1	76	29	906	13.8	67	20	900	2.3	54	30	902	6.2	78	30	906	16.8	80
1,500	29	849	3.1	72	30	838	−6.6	77	30	845	1.4	71	29	854	12.4	60	20	846	0.8	52	28	848	3.7	77	30	855	14.4	73
2,000	29	798	1.8	66	30	786	−7.7	74	29	794	−0.3	69	29	804	11.3	48	20	795	−0.3	51	28	797	1.3	76	30	805	12.4	60
2,500	29	750	0.0	61	30	737	−9.5	72	28	746	−1.8	65	29	757	9.2	43	20	746	−2.4	51	28	748	−1.2	74	30	759	11.1	47
3,000	29	704	−2.1	59	30	691	−12.0	71	28	700	−3.9	61	29	713	7.0	40	20	701	−4.6	55	28	703	−6.3	66	30	715	9.3	42
4,000	28	621	−6.6	52	30	605	−17.6	69	26	616	−9.5	58	28	631	1.8	36	20	617	−9.8	49	22	619	−8.6	60	30	633	4.4	33
5,000	28	546	−12.4	47	30	529	−23.4	68	26	541	−15.2	58	28	557	−4.0	30	19	542	−15.2	47	22	543	−13.4	55	30	559	−1.6	31
6,000	28	478	−18.7	44	29	461	−29.7	67	24	473	−21.6	57	27	490	−10.7	27	18	475	−20.9	44	21	475	−20.0	51	29	492	−7.9	27
7,000	27	417	−25.2	42	28	399	−36.0	65	23	412	−28.3	56	27	429	−17.9	27	18	414	−27.9	40	20	414	−27.2	51	29	432	−15.0	25
8,000	27	363	−32.3	41	26	345	−41.7	----	22	358	−34.9	56	26	375	−25.4	27	17	359	−35.1	----	20	359	−34.1	50	27	378	−22.2	24
9,000	27	314	−39.7	----	21	297	−46.4	----	21	309	−41.4	----	26	326	−32.8	27	17	310	−42.5	----	19	311	−41.0	----	24	328	−29.5	24
10,000	26	271	−47.0	----	19	255	−49.6	----	21	266	−47.9	----	26	282	−40.1	----	16	267	−49.4	----	18	268	−48.4	----	24	285	−36.7	24
11,000	26	232	−53.1	----	15	219	−52.5	----	20	229	−53.2	----	25	243	−47.0	----	16	230	−55.0	----	18	230	−54.6	----	24	246	−44.0	----
12,000	25	198	−57.1	----	13	187	−53.8	----	17	196	−56.1	----	24	208	−53.6	----	14	196	−57.7	----	18	196	−57.1	----	24	212	−51.1	----
13,000	25	169	−59.1	----	12	160	−53.2	----	15	167	−56.9	----	23	178	−59.0	----	12	167	−58.6	----	14	167	−58.9	----	20	181	−57.8	----
14,000	22	144	−60.7	----	9	137	−53.4	----	12	142	−57.0	----	19	151	−63.1	----	10	143	−59.2	----	13	142	−59.6	----	19	154	−64.2	----
15,000	21	122	−62.9	----	9	116	−53.5	----	10	121	−57.6	----	17	128	−66.8	----	8	122	−60.2	----	12	121	−61.0	----	17	131	−68.9	----
16,000	15	104	−64.7	----	5	99	−52.7	----	7	103	−58.8	----	12	109	−69.9	----	7	105	−61.1	----	11	103	−62.7	----	13	110	−73.4	----
17,000	13	87	−65.6	----									10	92	−70.8	----					6	87	−62.3	----	10	93	−75.1	----
18,000	8	74	−63.9	----									7	78	−71.2	----					5	74	−62.4	----	10	78	−73.5	----
19,000													5	66	−69.7	----									5	66	−70.0	----

Altitude (meters) m. s. l.	Nashville, Tenn. (180 m.)				(1) Norfolk, Va. (4 m.)				Oakland, Calif. (6 m.)				Oklahoma City, Okla. (391 m.)				Omaha, Nebr. (301 m.)				(1) Pensacola, Fla. (24 m.)				Phoenix, Ariz. (339 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
	Stations and elevations in meters above sea level																											
Surface	22	997	11.2	74	29	1,020	11.2	75	30	1,018	12.0	79	30	971	9.3	69	28	980	3.3	75	25	1,018	17.0	72	30	974	13.1	58
500	22	960	10.8	73	29	982	10.3	63	30	960	11.7	70	30	958	10.2	69	28	957	4.3	71	25	961	15.7	55	30	956	19.2	42
1,000	22	904	9.1	70	29	905	7.7	65	30	904	10.8	65	30	902	10.0	65	28	900	3.6	67	25	907	13.4	47	30	902	17.9	34
1,500	22	851	7.7	70	29	852	5.3	61	30	851	9.6	56	30	850	9.0	62	28	846	2.3	60	25	854	11.3	43	30	850	14.7	34
2,000	22	800	5.9	67	29	801	3.6	57	29	801	7.4	48	30	800	7.8	57	28	795	0.8	56	24	804	9.6	34	30	801	11.3	36
2,500	22	753	3.9	62	29	753	2.2	53	29	753	4.9	43	30	752	6.1	52	28	747	−1.2	52	24	757	7.9	31	30	754	8.4	36
3,000	22	708	1.3	55	29	707	0.2	47	29	708	2.3	43	30	708	3.9	47	28	701	−3.6	51	23	713	6.0	25	30	710	5.7	34
4,000	22	625	−2.7	50	27	624	−5.0	41	28	625	−3.2	44	29	625	−1.1	39	28	617	−9.3	49	21	630	0.8	30	30	628	0.8	30
5,000	22	550	−7.8	44	24	549	−11.2	36	28	550	−8.9	44	28	550	−7.5	35	28	542	−15.6	45	20	556	−5.9	32	30	554	−8.6	29
6,000	19	483	−14.2	46	21	481	−17.6	32	28	483	−15.0	44	28	483	−14.5	33	27	474	−22.3	43	15	488	−12.5	35	30	486	−12.2	29
7,000	19	423	−21.1	44	18	420	−24.4	29	27	422	−21.6	45	28	423	−22.0	32	27	412	−28.7	43	14	428	−19.9	44	27	426	−19.7	29
8,000	19	368	−28.4	43	----	----	----	----	27	368	−28.8	44	28	368	−29.5	31	26	358	−35.7	42	11	373	−27.3	----	26	372	−27.3	29
9,000	18	320	−35.7	45	----	----	----	----	27	319	−36.4	44	28	320	−36.7	31	26	309	−43.0	----	11	324	−34.8	----	26	322	−35.1	29
10,000	17	277	−43.3	----	----	----	----	----	26	276	−44.2	----	27	277	−43.6	----	26	266	−49.5	----	11	280	−42.3	----	26	279	−43.0	----
11,000	15	238	−50.1	----	----	----	----	----	24	237	−51.8	----	26	238	−50.8	----	26	228	−54.6	----	9	241	−49.8	----	25	240	−50.9	----
12,000	12	204	−55.6	----	----	----	----	----	23	202	−58.0	----	25	203	−56.6	----	25	195	−57.1	----	6	207	−56.5	----	25	205	−57.1	----
13,000	11	174	−58.9	----	----	----	----	----	23	172	−61.0	----	25	174	−59.5	----	25	166	−58.2	----	5	176	−61.6	----	25	175	−61.0	----
14,000	10	148	−61.0	----	----	----	----	----	23	146	−62.3	----	23	148	−62.0	----	24	141	−59.5	----	----	----	----	----	25	149	−63.4	----
15,000	10	126	−63.0	----	----	----	----	----	23	124	−63.9	----	22	126	−64.8	----	24	120	−60.9	----	----	----	----	----	25	126	−66.1	----
16,000	10	107	−65.1	----	----	----	----	----	21	105	−65.9	----	20	106	−67.4	----	23	102	−61.3	----	----	----	----	----	24	107	−68.7	----
17,000	10	91	−66.8	----	----	----	----	----	21	89	−67.1	----	17	90	−69.6	----	18	87	−61.8	----	----	----	----	----	22	90	−69.5	----
18,000	8	77	−68.3	----	----	----	----	----	17	76	−66.5	----	14	76	−70.1	----	13	74	−61.7	----	----	----	----	----	21	77	−69.0	----
19,000	7	65	−67.6	----	----	----	----	----	11	64	−65.5	----	11	64	−67.1	----	7	62	−60.8	----	----	----	----	----	12	65	−67.2	----
20,000	5	55	−66.4	----	----	----	----	----	5	54	−63.0	----	5	54	−63.0	----	----	----	----	----	----	----	----	----	6	55	−64.8	----

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during November 1942*—Continued

Altitude (meters) m. s. l.	Portland, Maine (20 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)				San Antonio, Tex. (242 m.)				San Diego, Calif. (19 m.)				S. S. Marie, Mich. (221 m.)				(1) Seattle, Wash.			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	1,014	0.9	82	30	997	7.9	77	30	988	0.3	74	27	990	14.8	77	29	1,012	15.5	82	30	987	−0.5	86	Not summarized. Insufficient number of observations.			
500	30	956	2.1	74	30	958	7.0	75	30	955	−0.1	75	27	961	16.4	72	29	957	15.1	56	30	953	−1.0	86				
1,000	30	898	0.0	71	30	901	5.6	74	30	898	−1.2	72	27	906	14.6	67	29	902	14.1	45	30	895	−3.3	83				
1,500	30	844	−1.0	64	30	848	4.8	73	30	843	−1.5	64	27	854	13.1	64	29	850	12.5	37	30	840	−5.2	81				
2,000	30	792	−2.6	59	30	797	3.6	68	30	791	−3.4	61	27	804	11.5	56	28	801	10.6	31	30	788	−6.8	74				
2,500	30	743	−4.8	57	30	749	1.4	63	30	743	−5.2	57	27	757	10.3	47	27	754	8.6	28	30	739	−8.3	66				
3,000	30	697	−7.3	58	30	704	−0.8	57	30	696	−7.7	55	27	713	7.8	43	26	709	6.4	25	29	693	−10.5	62				
4,000	30	612	−12.4	58	30	620	−5.5	51	30	612	−13.5	57	26	631	1.5	43	26	627	0.4	26	29	607	−15.5	56				
5,000	29	537	−18.5	53	29	546	−11.2	46	30	536	−19.3	58	25	557	−3.9	36	25	552	−5.8	31	28	531	−21.4	58				
6,000	29	469	−24.8	49	29	478	−18.0	42	28	468	−25.7	58	24	490	−10.3	33	24	485	−12.8	31	26	464	−27.3	59				
7,000	29	407	−31.4	49	29	418	−25.0	41	27	406	−31.9	56	24	429	−18.0	31	24	425	−20.3	28	25	402	−33.9	59				
8,000	29	353	−38.2	49	29	363	−32.0	42	26	351	−39.0	54	24	375	−25.4	31	10	371	−28.0	----	23	348	−40.6	----				
9,000	29	304	−44.6	----	29	314	−39.6	42	23	304	−45.6	----	24	325	−32.8	30	10	323	−35.6	----	22	300	−46.1	----				
10,000	27	261	−50.2	----	29	271	−46.8	----	23	261	−51.0	----	24	282	−40.3	----	7	279	−43.4	----	20	258	−50.5	----				
11,000	25	224	−54.1	----	28	232	−53.3	----	21	224	−54.9	----	22	243	−47.9	----					19	222	−53.8	----				
12,000	22	192	−55.9	----	28	199	−57.5	----	17	191	−57.0	----	22	208	−54.0	----					16	190	−56.2	----				
13,000	20	164	−57.5	----	26	169	−59.0	----	15	163	−57.8	----	22	178	−59.6	----					14	162	−56.6	----				
14,000	16	139	−58.1	----	23	144	−60.4	----	10	139	−57.5	----	19	151	−64.3	----					8	139	−56.8	----				
15,000	13	119	−58.4	----	22	122	−61.6	----	7	119	−57.5	----	19	128	−68.9	----					6	119	−58.7	----				
16,000	8	101	−60.0	----	22	104	−63.2	----					13	108	−72.8	----					5	102	−60.4	----				
17,000					16	88	−64.6	----					7	91	−75.4	----												
18,000					12	74	−65.2	----																				
19,000					6	63	−64.1	----																				

Altitude (meters) m. s. l.	Spokane, Wash. (598 m.)				Washington, D. C. (25 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	945	1.9	85	30	1017	7.8	69
500					30	960	6.8	66
1,000	29	899	0.4	80	30	903	4.5	66
1,500	29	844	−1.7	76	30	849	3.0	64
2,000	29	792	−4.2	70	30	798	1.2	65
2,500	29	744	−6.6	67	30	750	−0.2	60
3,000	29	697	−9.4	64	30	704	−2.1	58
4,000	28	612	−15.3	57	30	621	−6.6	52
5,000	27	535	−21.6	52	29	546	−11.7	45
6,000	27	466	−27.6	47	29	478	−18.0	44
7,000	27	405	−34.1	46	29	417	−24.9	43

Altitude (meters) m. s. l.	Spokane, Wash. (598 m.)				Washington, D. C. (25 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
8,000	26	350	−39.6	46	29	362	−32.4	41
9,000	26	302	−45.3	----	28	314	−39.8	41
10,000	25	259	−49.8	----	28	271	−46.8	----
11,000	25	222	−53.0	----	25	232	−53.3	----
12,000	25	190	−54.5	----	24	198	−57.8	----
13,000	24	163	−54.5	----	22	169	−58.9	----
14,000	22	139	−54.5	----	19	144	−60.7	----
15,000	21	119	−55.2	----	19	122	−62.5	----
16,000	17	101	−55.4	----	15	104	−64.4	----
17,000	15	86	−55.4	----	11	88	−64.9	----
18,000	9	73	−55.1	----				

All observations taken at 11 p. m., 75th meridian time.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity are missing for some observations at certain levels, also, the humidity data are not used in daily observations when the temperature is below −40° C.

Stations marked with the figure one (1) are Navy Stations.

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during November 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m.s.l.	Abilene, Tex. (538 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	237	2.9	30	279	1.3	28	303	1.0	28	249	3.8	29	268	3.2	25	312	0.7	30	132	3.2	27	252	3.8	29	231	1.4	29	314	0.4	28	223	1.8	29	4	1.0	30	246	2.2
500							28	270	1.1										30	144	4.2	27	248	6.4	29	231	4.5	29	281	1.1	28	225	4.3						
1,000	29	229	4.8				28	284	1.0				29	269	4.6	25	291	0.6	25	162	3.3	19	247	9.1	27	251	6.9	28	261	1.9	24	235	8.1						
1,500	29	237	5.4				27	284	2.6	28	252	6.4	29	284	7.6	25	215	1.4	23	194	3.2	17	252	10.6	24	260	9.7	28	266	4.1	20	245	10.4				30	271	1.0
2,000	28	254	7.3	30	284	2.6	26	282	5.3	27	270	8.1	28	277	9.6	25	235	3.3	21	219	2.0	16	261	12.1	16	279	9.9	28	263	5.4	18	263	14.1	29	326	1.5	30	258	4.8
2,500	28	270	9.7	30	280	4.4	26	275	7.7	27	280	10.2	26	277	10.9	22	264	6.3	19	267	2.2	11	267	10.4	11	293	11.6	24	262	7.6	12	270	14.8	29	258	2.7	30	260	6.7
3,000	25	268	10.3	30	280	6.6	26	272	8.9	26	277	11.3	26	282	12.6	20	267	8.0	18	251	2.5							22	268	9.3	10	276	14.9	28	274	5.9	30	262	7.8
4,000	24	263	13.1	28	281	12.8	24	270	13.0	22	274	15.6	23	284	14.9	13	262	9.7	14	269	3.6							20	273	12.5				28	282	12.0	28	271	10.5
5,000	22	261	12.3	27	279	13.9	22	275	16.0	14	287	14.5	18	285	16.8	13	271	13.4	13	286	4.8							16	275	12.9				26	285	19.8	26	267	12.0
6,000	20	265	13.8	27	275	17.3	21	278	18.2	12	303	17.3	14	286	18.9	12	277	16.0	13	286	5.9							15	271	13.7				24	282	21.8	24	267	13.1
8,000	17	276	17.0	19	283	15.8	15	284	20.8										12	286	10.9							10	278	14.2				24	282	28.4	19	275	14.3
10,000	13	281	20.9	12	297	19.2													12	264	18.3													12	278		16	266	19.0
12,000	12	286	24.4																11	260	26.8																11	274	18.9
14,000	10	280	28.9																																				

Altitude (meters) m.s.l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	223	1.3	30	291	1.2	28	300	1.1	27	274	2.4	29	40	2.4	26	242	1.8	30	90	1.2	25	196	2.6	24	325	1.2	30	64	3.1	30	54	1.0	30	214	2.2	27	311	3.7
500							28	275	2.7				29	45	1.9	26	231	3.6				25	203	4.6	24	321	1.2	30	58	6.1	30	91	0.6	30	207	4.4	27	299	4.9
1,000							28	260	4.2	27	260	5.2	25	280	0.9	23	241	6.0	30	102	0.5	23	220	5.9	24	198	1.5	28	52	4.6	28	105	0.3	29	223	4.9	25	295	7.3
1,500							28	276	6.5	26	265	9.0	25	274	2.9	22	255	8.4	30	223	1.4	21	243	8.6	24	225	4.5	27	60	3.3	28	305	1.5	27	243	7.1	21	293	10.3
2,000	30	224	1.9	30	275	1.5	25	285	8.8	24	267	10.9	23	276	5.3	16	271	13.1	30	250	3.3	19	254	10.3	21	243	5.6	23	50	2.6	27	282	3.2	24	262	8.6	15	288	10.7
2,500	30	237	3.3	30	232	2.9	22	280	10.2	22	270	12.0	22	275	7.1	13	280	15.8	30	264	4.5	18	260	11.4	20	256	7.4	20	2	2.2	24	274	5.7	22	271	10.6	12	295	14.3
3,000	29	256	4.4	30	234	5.4	19	274	13.0	20	274	13.1	19	276	8.3	13	285	18.9	30	271	6.0	16	278	13.7	17	262	8.0	18	337	1.9	23	266	7.5	21	266	12.8			
4,000	24	272	10.1	27	272	11.2	19	283	15.9	13	279	14.5	15	280	11.4				28	287	9.0	13	283	15.9	13	287	12.4	16	287	2.8	20	277	9.8	14	284	15.3			
5,000	20	280	13.3	18	288	15.9	17	278	18.4	11	284	18.5	15	276	11.9				28	285	11.5				10	290	14.6	16	272	2.5	19	273	10.7	14	280	19.1			
6,000	19	279	17.6	12	281	14.6	15	282	20.2				13	283	13.0				28	285	14.1							13	285	4.3	15	272	11.1	13	282	20.2			
8,000	16	290	20.2				12	276	21.1										25	286	18.6							10	287	14.0	14	277	17.5	10	284	25.1			
10,000	14	292	21.0																21	293	22.0										12	280	22.8						
12,000	12	282	25.1																17	297	22.9										10	275	29.6						
14,000																			11	310	21.3																		

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (388 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	271	2.5	27	257	2.1	27	257	1.1	30	218	0.5	29	315	1.5	23	204	3.0	28	244	1.1	30	164	0.8	29	284	3.6	19	310	0.9	26	199	3.3	24	214	1.6	28	267	2.4
500	29	341	0.9	27	248	2.3	27	216	1.6	30	207	0.8				23	217	6.0	28	237	1.9	30	176	2.2	29	294	2.6	19	256	1.9	26	195	4.3				28	257	3.9
1,000	24	300	1.5	26	230	4.5	25	222	3.5	30	174	1.0	29	316	1.8	20	225	8.0	28	250	4.3	28	190	2.8	28	332	0.8	18	266	5.4	21	199	7.1	24	202	3.0	27	273	4.8
1,500	23	294	4.1	25	245	5.2	24	233	6.0	30	206	1.5	29	297	5.0	20	245	10.1	23	271	7.1	26	217	3.4	28	32	1.3	13	262	6.8	17	205	7.7	16	188	5.0	26	281	7.4
2,000	21	294	4.3	23	260	6.8	24	254	7.5	30	229	2.1	29	284	7.0	17	269	11.9	22	271	7.7	24	238	5.8	28	344	2.5	11	267	9.1	13	217	5.7	11	214	5.5	23	282	11.2
2,500	20	290	5.2	22	266	10.0	21	264	9.7	29	260	3.3	28	284	9.0	16	277	13.6	19	278	10.3	22	252	6.6	28	317	4.0				12	238	6.0				21	285	12.7
3,000	19	289	8.1	22	271	12.0	19	265	12.4	29	265	4.7	27	284	12.1	16	275	14.6	15	288	12.2	20	263	6.6	27	309	5.5				11	253	8.1				20	279	14.5
4,000	18	278	9.7	21	270	16.0	18	279	15.9	28	277	8.1	25	279	14.0	15	283	16.1				18	276	8.9	24	286	6.8										17	282	18.3
5,000	18	287	12.0	20	277	17.1	15	277	16.9	27	279	9.8	18	286	15.5	11	280	18.0				16	269	11.2	21	278	8.5										12	280	22.5
6,000	18	284	15.8	20	281	18.9	14	284	22.6	27	277	12.6	14	292	16.8	11	287	22.0				15	273	11.8	15	271	10.6										10	275	24.9
8,000	14	270	15.2	17	282	21.5	10	284	27.9	23	277	14.8										13	279	14.3															
10,000	10	261	13.7	15	278	23.5				19	269	16.9										10	286	19.4															
12,000										16	275	19.7																											
14,000										11	278	22.8																											

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TABLE 3.—*Maximum free-air wind velocities (M. P. S.) for different sections of the United States, based on pilot-balloon observations during November 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	43.2	NW	2,500	28	Boston, Mass.	58.0	NW	2,980	28	Boston, Mass.	67.0	NNW	8,520	15	Caribou, Maine.
East-Central [2]	36.0	WNW	2,090	13	Washington, D. C.	48.0	NW	4,530	27	Knoxville, Tenn.	76.0	WSW	9,840	11	Greensboro, N. C.
Southeast [3]	30.2	SW	2,450	24	Charleston, S. C.	34.4	WNW	4,610	27	Birmingham, Ala.	66.0	W	13,080	13	Tampa, Fla.
North-Central [4]	44.4	NW	1,430	12	Duluth, Minn.	55.0	NW	4,820	12	Fargo, N. Dak.	74.4	NW	10,370	8	Detroit, Mich.
Central [5]	38.3	SW	1,240	16	Indianapolis, Ind.	43.2	WNW	3,150	12	Joliet, Ill.	63.0	W	7,280	17	Omaha, Nebr.
											63.0	W	8,910	10	St. Louis, Mo.
South-Central [6]	40.8	W	2,430	30	Abilene, Tex.	35.3	WSW	4,960	16	Amarillo, Tex.	65.0	WSW	11,410	30	Oklahoma City, Okla.
Northwest [7]	35.0	SSW	1,540	2	Seattle, Wash.	50.4	W	3,860	29	Ellensburg, Wash.	56.0	NW	5,770	25	Pocatello, Idaho.
West-Central [8]	41.9	W	2,480	17	Cheyenne, Wyo.	58.0	SW	4,340	3	Ely, Nev.	70.0	NNW	10,200	29	Pueblo, Colo.
Southwest [9]	35.8	W	2,480	30	El Paso, Tex.	40.9	W	4,960	17	Albuquerque, N. Mex.	68.0	W	12,050	9	Albuquerque, N. Mex.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS

By: BENNETT SWENSON

Precipitation during November was abnormally heavy in a large northwestern area, including northern California, and also from the central Mississippi Valley and Lake Region eastward. The month was abnormally dry in the South, especially the Southwest where very little precipitation occurred; New Mexico had only 3 percent of normal rainfall for the month.

The only flooding of consequence during the month was in the Willamette River Basin in Oregon. There was considerable flooding of lowlands and record or near record stages were reached in some cases.

Flooding in the Willamette Basin occurred at three distinct periods near the end of the month, namely, November 23–25; 27–28; and 29–30. In the first period, stages were generally higher in the lower basin while in the last period the highest stages were in the upper basin.

The Ohio River was at a low stage at the beginning of the month but several rises occurred thereafter and at the end of the month moderate stages existed. In the Mississippi River, seasonable moderate stages prevailed, the highest stages being reached near the end of the month.

The extreme upper Mississippi River was reported closed to navigation on November 26, and all pools frozen over by December 2.

FLOOD-STAGE REPORT FOR NOVEMBER 1942

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM					
Upper Mississippi Basin	*Feet*			*Feet*	
Illinois: Beardstown, Ill.	14	29	30	14.2	29–30
Mississippi: Louisiana, Mo.	12	22	23	12.	22
				12.1	23
Ohio Basin					
West Fork White: Edwardsport, Ind.	12	21	21	12.7	21
		24	26	12.7	25
Arkansas Basin					
Black: Black Rock, Ark.	14	23	24	14.6	23
Lower Mississippi Basin					
St. Francis: Fisk, Mo.	20	26	26	20.3	26
WEST GULF OF MEXICO DRAINAGE					
East Fork of Trinity: Rockwall (near), Tex.	10	6	8	10.6	
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Middle Fork of Willamette: Eula, Oreg.	13	27	27	13.4	27
		29	30	17.0	29
Coast Fork of Willamette: Saginaw, Oreg.	9	29	29	9.5	29
		23	24	15.9	23
McKenzie: Leaburg, Oreg.	12	27	28	17.8	27
		29	(1)	19.4	29
		23	25	20.8	24
Santiam: Jefferson, Oreg.	13	26	29	19.8	27
		29	(1)	19.6	30
		24	25	28.4	24
Luckiamute: Suver, Oreg.	25	27	(1)	28.5	27
South Yamhill: Willamina, Oreg.	8	23	23	10.3	23
		26	26	9.2	26
Long Tom: Monroe, Oreg.	10	24	25	11.5	24
		27	28	10.4	28
Willamette: Eugene, Oreg.	12	27	27	12.0	27
		30	30	14.6	30
Harrisburg, Oreg.	10	24	25	13.8	24–25
		27	(1)	15.7	30
Albany, Oreg.	20	29	29	20.3	29
Salem, Oreg.	20	30	(1)	21.3	30
Oregon City, Oreg.	12	26	(1)	13.0	29–30

[1] Continued into following month.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW January 1940, p. 32]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	57.4	+3.1	Robertsdale	87	[1] 7	Evergreen	19	28	1.77	−1.64	Samantha	4.32	Fort Deposit	T
Arizona	53.4	+2.8	3 stations	91	[1] 2	Fort Valley	2	21	.11	−.89	Payson	.82	66 stations	0.00
Arkansas	54.5	+3.2	Wabash	88	[1]18	Mount Ida	18	27	3.83	+.07	Eureka Springs	8.74	Texarkana	.64
California	51.9	−.3	Palm Springs	95	[1] 1	Sierraville	−5	20	3.78	+1.42	Crescent City (near)	27.14	20 stations	.00
Colorado	37.6	+2.4	2 stations	82	19	Fraser	−15	26	.55	−.22	Columbine	4.23	4 stations	.00
Florida	67.2	+2.2	6 stations	92	[1] 9	Jasper	26	28	.74	−1.43	Homestead	3.66	Avon Park	T
Georgia	56.8	+2.2	Waycross	88	10	Blairsville	15	28	1.68	−.91	Augusta	4.52	Everett City	.32
Idaho	34.4	−1.0	Milner Dam	74	2	Blackfoot Dam	−15	21	4.09	+2.01	Roland	12.24	May	.59
Illinois	44.9	+2.7	5 stations	80	19	Minonk	8	30	5.12	+2.48	Anna	8.42	Belvidere	2.19
Indiana	45.2	+2.8	Tell City	80	18	Goshen	3	30	4.83	+1.76	2 stations	7.62	2 stations	2.89
Iowa	38.8	+2.5	Keosauqua	80	19	Sioux Rapids	−10	29	1.76	+.15	Donnellson	4.64	Akron	.15
Kansas	45.4	+2.2	Syracuse	87	19	Oberlin	−3	29	.75	−.53	Bethel (near)	3.90	5 stations	T
Kentucky	49.8	+3.4	11 stations	80	[1] 9	Lynch (near)	18	29	4.88	+1.46	Shelbyville	6.63	Lynch (near)	1.83
Louisiana	61.7	+2.9	Urania	89	8	Robeline	23	27	1.17	−1.67	Kisatchie (near)	3.40	3 stations	.00
Maryland-Delaware	47.2	+2.0	La Plata, Md	81	20	Mount Savage Summit, Md.	11	14	2.40	−.14	2 stations	3.81	Oxford, Md	1.35
Michigan	36.5	+.2	Benton Harbor	71	19	2 stations	−20	29	2.68	+.16	Kenton	4.97	Mio	.85
Minnesota	29.9	+.3	3 stations	68	[1]14	Zumbrota	−17	29	.49	−.65	Pigeon River Bridge	2.49	Madison	T
Mississippi	58.7	+3.6	Duck Hill	89	8	Batesville	24	27	1.40	−2.17	Lambert	4.36	Telahatchie	.19
Missouri	47.9	+3.5	2 stations	82	[1]18	2 stations	6	29	4.30	+1.59	Rolla	8.91	Maryville	1.30
Montana	30.8	−1.3	2 stations	73	[1]13	Wisdom	−16	21	1.72	+.68	Summit	7.43	Dooley	.03
Nebraska	39.1	+1.8	3 stations	80	[1]15	Mitchell (near)	−14	22	.44	−.31	Falls City	1.62	3 stations	T
Nevada	42.0	+2.0	Mesquite	85	13	Ely	−3	21	1.28	+.61	Lewers Ranch	10.14	9 stations	.00
New England	38.0	.0	Chestnut Hill, Mass	75	1	Kearsarge, N. H.	0	30	4.80	+1.32	Burlington, Conn	7.87	Presque Isle, Maine	1.48
New Jersey	44.9	+1.2	Pleasantville	78	21	3 stations	12	[1]15	4.14	+.94	Lakewood	7.10	Bridgeton	2.04
New Mexico	45.9	+3.4	2 stations	89	[1] 9	Selsors Ranch	−5	[1]21	.02	−.62	Selsors Ranch	.59	120 stations	.00
New York	38.9	+.8	Port Jervis	76	20	2 stations	−5	15	3.75	+.75	South Wales	6.81	Chazy	1.13
North Carolina	51.9	+1.9	2 stations	84	[1]19	Mount Mitchell	5	27	1.76	−.84	Highlands (near)	3.89	Willard	.12
North Dakota	28.0	+1.3	Hettinger	73	15	Eckman	−14	30	.18	−.40	Pembina	.55	7 stations	T
Ohio	43.6	+2.1	4 stations	78	20	Millport	11	15	3.72	+1.01	Portsmouth No. 2	5.94	Canton	2.09
Oklahoma	52.8	+3.1	Altus	87	9	Hooker	9	29	1.64	−.40	Watts	7.21	2 stations	.00
Oregon	40.0	−.4	Brookings	75	11	Seneca	−9	23	7.70	+3.98	Valsetz	34.99	Plush	1.16
Pennsylvania	41.8	+.4	Phoenixville	82	20	Montrose	0	15	3.35	+.49	Kane	5.77	Hyndman	1.19
South Carolina	56.2	+2.4	2 stations	90	[1] 1	5 stations	21	[1]28	1.64	−.67	Aikens	4.15	Georgetown	.30
South Dakota	34.9	+1.7	Vale	85	15	Wood	−10	29	.38	−.23	Harveys Ranch	2.53	3 stations	T
Tennessee	52.3	+3.8	Moscow	85	19	Gatlinburg	12	28	2.74	−.78	Cookeville	6.86	Kingston	.97
Texas	60.2	+3.1	Laredo	99	25	Spearman	11	29	1.20	−.98	Sugarland	5.45	27 stations	.00
Utah	38.3	+.9	Bluff	82	3	Woodruff	−8	21	1.82	+.87	Rice Canyon	8.71	2 stations	.00
Virginia	48.7	+2.1	Glen Lyn	86	21	Mountain Lake	12	14	1.71	−.71	Burkes Garden	3.62	Langley Field	.60
Washington	37.6	−2.1	Darrington	71	3	Stockdill Ranch	0	20	7.57	+2.53	Peterson's Ranch	31.34	Oroville	1.00
West Virginia	44.7	+1.5	2 stations	80	20	2 stations	9	28	3.81	+1.06	Creston	6.95	2 stations	1.56
Wisconsin	33.8	+.4	Beloit	72	19	Blair	−15	29	1.96	+.11	Whitewater	4.89	Weyerhauser	.48
Wyoming	32.5	+.9	Hawk Springs	78	15	Foxpark	−14	20	1.64	+.94	Grassy Lake Dam	9.76	2 stations	.23
Alaska (October)	32.6	+2.4	Wasilla	66	1	2 stations	−11	12	4.39	+.80	Baranof	40.16	Tanacross	.21
Hawaii	74.4	+2.2	Kuala Puu (Molokai)	92	22	Volcano Observatory, Hawaii.	43	22	5.39	−2.23	Kukui (Maui)	22.00	Mahukona	.00
Puerto Rico	77.2	+.8	Guayama	95	8	Guineo Reservoir	58	23	10.88	+3.48	La Mina (El Yunque)	22.78	Yauco	4.10

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch, or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	° *F.*	° *F.*	° *F*		° *F*	° *F*		° *F*	° *F*	° *F*	° *F*	*%*	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
New England							39.4	+0.9										76	4.10	+0.9										6.3			
Eastport	76	67	85	29.89	29.98	−0.03	36.9	+.2	59	1	42	18	29	31	18	34	31	79	2.68	−.6	15	11.3	nw.	34	ne.	25	9	6	15	6.3	3.1	1.2	1
Greenville, Maine	1,070	6	41	28.80	30.00	.....	31.2	−.1	62	17	40	8	24	23	33	28	25	...	3.00	−.1	15	.....	nw.	...	...	...	4	10	16	.....	7.0	3.0	0
Portland, Maine [1]	103	5	36	29.88	30.00	−.01	36.2	.....	63	17	46	12	23	26	35	33	30	82	4.71	+1.2	12	8.5	nw.	33	nw.	28	12	7	11	5.4	1.1	T	0
Concord [3]	289	4	45	29.70	30.03	−.03	36.7	−1.0	69	1	47	10	23	26	44	32	28	76	4.80	+1.7	12	7.5	nw.	27	w.	14	6	8	16	6.8	3.9	1.0	0
Burlington [3]	403	11	48	29.56	30.01	−.04	36.2	−.1	62	1	43	11	30	29	25	33	29	78	1.65	−1.0	17	11.0	s.	37	s.	10	4	7	19	7.4	4.4	2.8	1
Northfield	876	12	60	.....	30.03	−.02	33.9	+1.1	63	20	43	3	30	24	34	...	...	...	3.15	+.2	13	7.4	n.	32	s.	10	9	3	18	6.8	12.1	6.0	0
Boston [1]	124	33	62	29.88	30.02	−.03	43.5	.....	71	1	51	20	15	36	30	38	32	69	4.69	+1.4	11	11.9	nw.	44	sw.	10	9	7	14	6.4	T	.0	0
Nantucket	12	10	63	30.01	30.02	−.03	45.6	+1.2	65	1	52	24	15	39	22	41	37	76	3.40	+.2	15	11.9	nw.	30	sw.	30	7	9	14	6.4	T	.0	1
Block Island	26	11	46	30.00	30.03	−.03	45.8	+1.2	65	1	52	25	15	40	21	42	37	72	4.46	+.8	15	18.3	nw.	47	nw.	14	13	6	11	5.1	T	.0	2
Providence [3]	159	46	60	29.86	30.04	−.03	43.7	+3.3	71	20	52	21	15	35	30	38	34	76	5.03	+2.0	13	9.5	n.	34	sw.	10	9	7	14	6.2	T	.0	1
Hartford [1]	159	5	44	.....	30.05	−.03	41.6	.....	72	20	51	19	23	32	...	...	...	...	7.05	+3.5	13	8.8	n.	34	sw.	10	5	11	14	.....	T	.0	1
New Haven [3]	107	74	153	29.94	30.06	−.01	44.2	+2.2	69	20	52	22	15	37	26	40	36	79	4.53	+1.2	13	9.5	n.	35	s.	10	7	14	9	5.9	T	.0	1
Middle Atlantic States							47.0	+2.2										72	2.56	0.0										5.4			
Albany [1]	97	26	40	29.93	30.04	−.04	38.4	+2.1	64	20	47	15	15	30	31	34	30	77	3.34	+.9	12	9.9	s.	38	s.	10	3	13	14	7.0	.9	.0	0
Binghamton	871	57	79	.....	30.06	−.03	40.0	+1.3	70	20	49	17	15	31	31	36	32	78	3.19	+.8	14	6.7	w.	24	w.	10	3	9	18	7.5	1.9	.0	0
New York	314	415	454	29.72	30.06	−.03	46.6	+2.4	70	20	54	25	15	39	27	41	34	65	4.47	+1.5	12	16.8	nw.	53	nw.	14	13	6	11	5.3	T	.0	2
Harrisburg [1]	374	30	49	.....	.....	.....	43.8	+1.0	77	20	53	22	15	35	...	...	...	...	2.19	−.1	13	8.3	nw.	41	s.	10	6	11	13	.....	T	.0	0
Philadelphia [3]	114	174	367	29.96	30.09	−.01	47.8	+2.1	73	20	55	26	28	40	29	40	35	73	3.79	+1.1	9	13.3	sw.	44	sw.	10	12	10	8	4.7	.0	.0	2
Reading	323	47	1306	29.72	30.08	.....	45.1	+1.3	75	20	54	23	15	36	34	...	...	...	3.33	+.6	10	11.8	nw.	48	nw.	13	13	7	10	4.9	T	.0	1
Scranton	805	72	104	29.18	30.06	−.03	41.4	+.9	70	20	50	19	15	33	32	...	...	...	3.41	+.6	12	7.0	sw.	30	nw.	13	6	14	10	6.0	T	.0	0
Atlantic City	52	37	172	30.02	30.08	−.02	49.6	+4.0	75	21	57	24	15	42	28	44	39	72	2.21	−.6	9	16.5	w.	42	se.	10	10	8	12	5.3	T	.0	1
Trenton	190	89	107	29.87	30.08	.....	45.8	+1.4	75	20	54	24	15	38	27	40	36	72	3.17	+.4	9	9.6	nw.	32	s.	10	12	6	12	5.5	T	.0	2
Baltimore [3]	123	100	215	29.97	30.10	−.01	49.0	+2.7	79	20	57	27	28	41	30	42	36	69	2.36	−.2	10	10.4	s.	40	sw.	13	13	9	8	4.9	.0	.0	1
Washington [1]	112	62	85	30.04	30.11	−.01	48.3	+3.1	79	20	57	25	15	40	29	42	36	68	2.10	−.3	9	7.8	nw.	28	nw.	13	8	14	8	5.1	.0	.0	1
Cape Henry	18	8	54	30.08	30.10	.....	54.4	+2.3	79	10	61	34	28	47	28	48	44	72	1.10	−1.3	8	13.9	sw.	41	w.	3	11	13	6	4.9	.0	.0	1
Lynchburg	686	144	184	29.39	30.12	−.01	49.9	+2.7	79	20	60	24	15	40	36	42	36	65	1.51	−.8	8	7.5	nw.	27	nw.	13	15	6	9	4.5	.0	.0	0
Norfolk [3]	91	80	125	30.02	30.12	+.01	54.8	+3.3	79	10	63	32	28	47	29	47	43	78	.96	−1.2	10	10.1	ne.	29	nw.	3	13	8	9	4.7	.0	.0	1
Richmond [3]	144	11	52	29.95	30.11	−.01	50.8	+2.5	79	20	61	23	15	41	32	45	42	81	1.23	−1.0	6	8.1	sw.	26	sw.	10	15	4	11	4.7	.0	.0	0
South Atlantic States							57.4	+2.9										75	1.72	−0.7										3.8			
Asheville	2,253	89	104	27.78	30.17	+.03	48.0	+2.9	76	20	58	18	28	37	36	41	36	73	.51	−1.7	3	8.8	nw.	27	nw.	27	13	8	9	4.5	T	.0	0
Charlotte [3]	779	63	86	29.30	30.14	+.01	53.3	+2.7	79	20	63	29	28	43	29	44	40	75	2.22	−.4	6	6.3	ne.	18	nw.	10	14	7	9	4.3	.0	.0	1
Greensboro [1]	886	6	56	29.19	30.15	.....	49.2	.....	79	21	61	22	28	37	35	42	38	76	1.27	...	8	7.8	ne.	25	w.	13	14	8	8	4.2	.0	.0	0
Hatteras	11	5	50	30.09	30.11	.00	58.6	+2.3	75	20	65	36	28	52	27	54	51	84	2.43	−1.1	6	13.6	ne.	37	sw.	10	16	6	8	4.3	.0	.0	3
Raleigh [1]	376	27	69	29.73	30.13	.00	53.0	+3.1	80	10	64	24	15	42	37	45	41	74	1.56	−.7	9	8.5	ne.	32	nw.	10	15	7	8	4.0	.0	.0	1
Wilmington	72	73	107	30.05	30.13	+.01	57.8	+1.8	80	21	68	32	28	47	30	51	46	75	.93	−1.0	4	8.6	ne.	24	nw.	27	20	6	4	3.1	.0	.0	0
Charleston [3]	48	11	92	30.07	30.12	.00	61.1	+3.0	82	10	70	36	28	52	25	51	48	79	1.56	−.6	5	10.2	n.	25	n.	11	26	1	3	2.0	.0	.0	2
Columbia, S. C. [2]	347	70	91	29.75	30.12	.00	57.4	+3.4	84	19	68	28	28	46	32	49	45	76	2.25	+.3	5	8.0	ne.	25	sw.	10	17	8	5	3.4	.0	.0	0
Greenville, S. C. [1]	1,040	70	78	29.03	30.14	.....	53.0	.....	78	20	64	27	28	42	30	45	39	69	1.39	−1.8	4	8.6	ne.	30	n.	11	12	9	9	4.6	.0	.0	0
Augusta [3]	182	62	77	29.93	30.13	.00	58.1	+3.6	84	19	70	31	28	46	32	49	43	63	4.52	+2.1	5	5.3	nw.	19	w.	13	19	4	7	3.3	.0	.0	1
Savannah [3]	65	73	152	30.05	30.13	+.01	62.3	+3.8	85	19	74	36	12	51	31	52	48	76	1.08	−1.0	4	9.7	ne.	28	nw.	13	22	4	4	2.7	.0	.0	1
Jacksonville [3]	43	86	110	30.06	30.11	+.01	64.4	+2.2	84	10	74	39	12	55	29	56	53	81	.51	−1.5	8	7.4	ne.	20	ne.	11	12	8	10	4.6	.0	.0	0
Florida Peninsula							73.0	+2.0										79	1.20	−1.1										4.1			
Key West [3]	21	10	64	29.98	30.00	−.02	76.0	+1.7	84	9	81	64	14	71	15	68	66	77	1.74	− .4	10	10.8	ne.	22	e.	15	10	19	1	3.9	.0	.0	.0
Miami [3]	25	124	168	30.00	30.02	−.04	73.7	+1.9	84	11	79	52	14	68	23	65	63	82	1.75	−1.2	7	10.9	ne.	33	ne.	6	14	11	5	4.2	.0	.0	0
Tampa [1]	35	5	61	30.04	30.07	−.01	69.4	+2.5	87	10	79	44	28	60	30	61	58	78	.10	−1.6	1	10.5	ne.	27	ne.	6	13	14	3	4.1	.0	.0	0
East Gulf States							59.0	+2.9										76	1.30	−1.9										3.5			
Atlanta [1]	1,173	5	72	28.89	30.14	+.01	54.4	+2.9	80	19	65	29	28	44	32	46	41	70	1.38	−1.7	3	8.9	nw.	26	n.	10	14	8	8	4.1	.0	.0	0
Macon [3]	370	79	87	29.73	30.13	.00	57.0	+2.8	83	19	69	29	28	45	36	48	43	68	2.62	+.1	3	6.2	nw.	20	nw.	10	18	7	5	3.3	.0	.0	0
Thomasville	273	49	58	29.85	30.15	+.03	61.1	+2.6	83	10	75	32	28	47	41	...	...	...	.53	−2.2	4	.....	...	...	...	...	15	8	7	.....	.0	.0	2
Apalachicola	35	11	.....	30.06	30.10	.....	63.2	.....	80	3	72	40	28	55	26	57	53	78	.32	−2.8	3	8.5	ne.	22	n.	27	19	5	6	2.8	.0	.0	1
Pensacola	56	54	79	30.06	30.12	+.01	62.4	+2.2	82	10	72	38	24	53	29	56	52	76	.43	−3.3	3	7.6	se.	22	ne.	10	20	6	4	3.1	.0	.0	1
Anniston	741	9	.....	.....	.....	.....	55.1	+3.2	81	19	68	24	28	43	37	...	...	...	1.72	−1.5	9	.....	nw.	...	...	...	12	12	6	.....	.0	.0	0
Birmingham [3]	700	11	48	29.39	30.14	+.02	56.8	+2.9	80	19	67	31	27	47	30	46	43	78	1.57	−1.7	5	7.5	s.	20	se.	28	16	9	5	3.5	.0	.0	0
Mobile [3]	57	6	30	30.07	30.13	+.02	60.8	+2.2	83	8	71	35	12	50	29	53	50	81	1.58	−2.1	7	6.4	n.	25	n.	11	18	4	8	3.5	.0	.0	1
Montgomery [3]	218	92	105	29.91	30.14	+.02	58.5	+2.7	81	18	70	32	28	47	32	50	45	71	1.42	−1.8	4	6.5	e.	18	n.	10	18	7	5	3.1	.0	.0	0
Meridian [3]	375	67	92	29.72	30.13	+.01	57.9	+3.7	82	8	70	30	28	46	35	50	46	79	.73	−2.6	4	6.1	sw.	17	se.	28	18	8	4	3.2	.0	.0	0
Vicksburg [3]	247	82	102	29.85	30.11	−.01	60.6	+4.0	83	8	71	35	27	50	29	48	46	82	1.13	−2.6	5	9.2	se.	28	se.	28	16	8	4	4.0	.0	.0	2
New Orleans [3]	53	76	84	30.05	30.11	+.01	64.2	+2.6	82	18	72	42	27	56	24	57	54	78	2.23	− .9	6	6.9	se.	20	ne.	11	14	9	7	4.1	.0	.0	2
West Gulf States							61.5	+3.9										75	2.20	−0.7										4.8			
Shreveport [1]	249	92	227	29.82	30.08	−.03	60.6	+5.6	84	9	72	30	27	49	38	53	48	73	.62	−3.0	7	10.8	se.	29	s.	25	13	7	10	5.0	.0	.0	2
Bentonville	1,303	12	51	28.70	30.08	−.03	50.1	+3.4	75	19	60	24	30	41	35	...	...	...	7.11	+4.1	13	8.1	s.	28	sw.	16	9	12	9	.....	T	.0	6
Fort Smith	463	57	82	29.55	30.03	−.08	54.6	+3.6	82	9	64	26	30	46	33	48	42	68	3.88	+1.0	10	8.9	e.	30	s.	16	11	6	13	5.4	.0	.0	3
Little Rock [1]	357	94	102	29.70	30.09	−.03	54.3	+2.2	82	19	65	26	30	44	35	48	45	77	2.76	−1.4	11	8.9	s.	27	s.	16	10	8	12	5.8	.0	.0	3
Austin [3]	605	68	90	29.42	30.06	.....	62.8	+4.3	85	25	74	33	27	52	35	56	52	76	1.98	− .3	4	10.6	s.	31	n.	25	13	9	8	4.5	.0	.0	1
Brownsville [3]	57	88	96	29.95	30.01	.....	69.7	+2.5	87	2	80	42	24	60	35	63	60	78	.86	−1.4	4	9.1	se.	26	n.	10	5	13	12	6.0	.0	.0	0
Corpus Christi [3]	20	11	78	30.02	30.04	−.03	69.0	+4.7	85	2	77	44	23	62	35	61	58	80	1.09	−.9	3	11.0	s.	29	n.	10	13	9	8	3.8	.0	.0	2
Dallas [1]	512	6	46	29.50	30.04	.....	59.8	.....	82	25	71	29	27	48	38	52	47	70	1.75	−.8	6	13.4	s.	37	s.	16	14	9	7	4.5	.0	.0	1
Fort Worth [1]	679	35	56	29.33	30.05	−.05	60.0	+5.5	83	17	71	29	29	49	40	52	47	70	.92	−1.7	4	13.6	s.	37	nw.	28	14	10	6	4.4	.0	.0	2
Galveston [3]	54	106	114	30.01	30.06	−.03	67.2	+3.9	80	5	73	44	23	62	29	62	59	80	4.20	+.9	5	11.1	s.	27	nw.	22	14	13	3	4.0	.0	.0	2
Houston [3]	138	157	190	29.92	30.08	.....	64.8	+3.8	84	2	74	38	27	56	37	57	54	81	2.55	−1.3	4	11.3	se.	31	n.	3	11	8	11	4.9	.0	.0	1
Palestine	510	64	72	29.54	30.08	−.03	61.8	+4.6	83	2	72	33	30	52	33	54	49	68	1.59	−1.8	7	8.9	s.	21	s.	15	13	6	11	4.5	.0	.0	0
Port Arthur	34	59	134	30.04	30.08	.....	65.0	.....	81	5	73	38	23	57	30	60	56	79	1.08	−2.0	5	13.0	s.	29	s.	28	13	7	10	4.3	.0	.0	2
San Antonio [1]	693	28	59	29.33	30.06	−.02	63.0	+2.7	86	25	75	32	23	51	43	55	51	71	.47	−1.4	4	8.4	s.	29	ne.	26	12	8	10	4.8	.0	.0	1

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
Ohio Valley and Tennessee	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	° *F.* 47.6	° *F.* +3.1	° *F*		° *F*	° *F*		° *F*	° *F*	° *F*	% 76	*In.* 3.90	*In.* +0.7		*Miles*								0–10 6.5	*In.*	*In.*	
Chattanooga [1]	762	21	54	29.32	30.15	+.01	51.5	+3.6	79	21	64	21	28	39	37	44	40	76	1.89	−1.5	6	6.1	s.	24	n.	2	10	10	10	5.0	.0	.0	1
Knoxville [2]	995	66	84	29.07	30.14	+.01	51.2	+3.3	78	20	62	22	28	40	38	44	39	71	.97	−2.1	5	7.2	ne.	35	sw.	10	12	6	12	5.1	.0	.0	1
Memphis [2]	399	78	86	29.67	30.09	−.03	55.6	+3.9	81	19	66	31	27	46	32	48	44	75	3.16	−1.1	9	8.8	s.	24	w.	10	13	5	12	5.2	.0	.0	3
Nashville [1]	546	5	72	29.52	30.11	−.01	52.8	----	80	19	63	27	28	43	34	46	40	71	2.27	−1.2	12	8.9	s.	35	sw.	10	10	10	10	5.4	.0	.0	1
Lexington	989	6	----	29.04	30.13	+.01	47.6	+2.8	78	20	57	21	27	38	34	----	----	----	5.72	+2.4	14	----	sw.	----	----	----	11	4	15	5.6	.0	.0	2
Louisville [2]	525	106	120	29.52	30.09	−.03	49.1	+2.4	77	9	57	23	27	41	35	43	38	76	5.99	+2.4	15	10.3	sw.	38	sw.	10	8	6	16	6.7	.0	.0	2
Evansville [1]	431	5	38	29.61	30.08	−.04	48.4	+4.0	78	9	57	22	27	40	35	43	39	76	6.07	+2.3	15	9.7	s.	35	sw.	10	8	6	16	6.8	.0	.0	2
Indianapolis [2]	823	98	129	29.16	30.06	−.04	45.7	+3.4	75	20	54	20	27	37	38	39	36	80	4.60	+1.2	12	9.3	s.	31	sw.	10	5	8	17	7.1	1.6	.0	4
Terre Haute [2]	575	68	149	29.44	30.06	----	46.2	----	77	19	54	22	27	38	31	41	37	80	7.62	+4.3	12	11.5	s.	32	sw.	9	6	9	15	6.7	T	T	3
Cincinnati [2]	627	11	51	29.41	30.10	−.02	46.8	+4.3	75	19	55	20	27	39	33	42	38	76	4.85	+2.0	13	8.9	s.	32	sw.	10	8	6	16	6.8	.0	.0	1
Columbus [2]	822	90	110	29.20	30.09	−.02	44.8	+2.9	74	20	53	20	27	37	36	39	35	76	3.08	+.3	11	11.2	s.	38	s.	10	5	7	18	7.4	2.0	T	2
Dayton [2]	900	186	213	29.10	30.08	----	45.4	+3.4	73	19	53	20	27	38	36	39	35	79	3.84	+1.0	11	12.0	sw.	40	sw.	10	5	6	19	7.4	T	T	0
Elkins [2]	1,947	61	78	28.04	30.13	+.01	43.5	+3.2	71	20	53	16	15	34	48	37	34	80	3.46	+.7	16	7.1	w.	35	w.	10	4	5	21	7.4	T	.0	0
Parkersburg	637	77	84	29.41	30.11	−.01	46.4	+2.6	75	20	55	22	28	38	37	42	37	74	2.48	−.1	11	6.7	se.	29	w.	10	7	6	17	7.0	T	.0	0
Pittsburgh [1]	842	39	54	29.18	30.09	−.01	42.6	+1.0	72	20	51	18	14	34	39	38	34	75	2.55	+.3	18	12.1	s.	41	nw.	13	5	8	17	7.2	1.8	.0	1
Lower Lake Region							40.9	+2.0									79	3.42	+0.6									7.4			
Buffalo [2]	768	243	180	29.19	30.04	−.01	40.3	+.9	63	10	47	19	14	34	29	36	32	79	4.26	+1.2	16	16.4	w.	59	sw.	12	5	10	15	6.9	8.7	1.5	0
Canton	448	10	61	29.51	30.00	----	35.8	+1.9	65	17	45	11	15	27	32	32	29	81	2.47	−.7	15	8.7	sw.	33	sw.	10	3	9	18	7.4	6.9	3.7	1
Ithaca	836	77	100	----	----	----	40.0	+1.4	66	20	48	19	14	32	----	----	----	----	3.02	+.7	15	10.4	nw.	34	s.	10	3	8	19	----	2.2	.5	0
Oswego	335	71	85	29.65	30.03	−.02	40.1	+1.2	65	20	47	20	15	34	24	36	31	72	2.91	−.5	21	11.3	s.	30	w.	10	6	8	16	7.0	8.7	3.1	0
Rochester [1]	523	5	69	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Syracuse [1]	596	5	51	29.38	30.04	−.02	39.8	+2.6	67	20	49	17	23	31	32	35	32	81	3.44	+.4	18	11.4	sw.	42	se.	10	4	11	15	6.9	8.7	T	0
Erie [2]	714	57	81	29.27	30.05	−.01	42.8	+1.4	65	20	49	25	27	37	30	37	34	79	3.67	+.4	15	10.0	sw.	28	w.	10	2	5	23	8.4	2.3	.0	0
Cleveland [1]	762	27	54	29.22	30.06	−.01	42.6	+3.6	70	20	51	22	27	34	36	38	34	76	3.30	+.7	17	13.3	sw.	42	sw.	10	5	3	22	7.9	3.5	1.0	2
Sandusky	629	5	67	----	----	----	43.0	+1.9	71	20	51	22	27	35	36	----	----	----	4.05	+1.7	14	11.1	sw.	30	nw.	13	4	6	20	7.5	3.0	1.7	0
Toledo [2]	628	79	87	29.36	30.05	−.02	42.2	+1.8	69	19	50	21	14	34	35	37	34	80	3.25	+.8	12	10.4	w.	30	w.	26	6	7	17	7.0	4.5	2.7	1
Fort Wayne [1]	857	69	84	29.11	30.05	----	41.6	+2.8	71	19	50	19	27	33	31	38	35	82	4.35	+1.5	12	10.4	sw.	32	nw.	10	5	7	18	7.3	6.2	4.1	3
Detroit [1]	730	5	78	29.24	30.04	−.02	41.2	+2.0	70	20	49	20	14	33	32	37	33	77	2.92	+.5	13	11.3	w.	35	w.	10	3	7	20	7.7	4.4	2.6	0
Upper Lake Region							35.9	+1.5									79	2.70	+0.3									7.3			
Alpena	609	5	89	29.30	29.98	−.03	36.2	+1.8	60	17	44	15	14	29	28	33	30	80	1.05	−1.6	13	11.7	nw.	37	nw.	13	4	6	20	7.5	2.4	T	0
Escanaba	612	51	72	29.29	29.97	−.06	33.7	+.6	53	17	40	10	29	27	25	30	26	76	1.72	−.4	11	11.9	nw.	38	nw.	13	6	8	16	6.8	2.6	.5	0
Grand Rapids [2]	707	70	244	29.23	30.01	−.04	41.0	+2.6	68	20	49	20	30	33	28	35	32	83	3.95	+1.2	13	13.1	s.	44	sw.	17	1	11	18	7.7	5.1	3.2	1
Lansing [2]	878	5	90	29.06	30.03	----	38.9	+1.4	65	16	47	14	30	31	30	35	32	81	3.45	+1.0	14	10.1	sw.	29	s.	9	7	5	18	7.4	6.0	4.0	1
Marquette	734	44	73	29.13	29.94	−.08	33.2	−.1	60	16	40	10	30	27	24	29	25	77	3.49	+.6	14	10.2	s.	41	s.	4	3	13	14	7.1	15.4	7.2	0
Sault Sainte Marie [1]	614	11	43	29.27	29.96	−.05	31.6	−.4	54	17	39	5	14	24	26	29	27	86	3.61	+.6	14	11.8	se.	44	nw.	12	3	12	15	7.5	12.7	.6	0
Chicago [1]	673	19	38	29.28	30.02	−.05	40.9	+3.2	73	19	50	15	27	32	30	37	34	80	3.71	+1.2	13	11.8	s.	34	sw.	17	4	8	18	7.5	3.3	1.7	2
Green Bay	617	109	141	29.30	29.99	−.05	35.4	+1.4	64	16	42	11	27	28	25	31	27	73	1.81	−.4	9	11.4	s.	32	s.	16	4	8	18	7.3	1.8	1.0	0
Milwaukee [1]	681	33	66	29.25	30.00	−.05	39.0	+3.1	67	19	47	12	30	31	28	35	32	78	3.27	+1.5	10	14.7	nw.	39	s.	16	5	7	18	7.3	5.1	4.2	2
Duluth	1,133	5	47	28.71	29.96	−.08	28.8	+1.2	56	16	37	−2	30	20	29	24	20	79	.97	−.5	4	13.0	nw.	42	nw.	26	8	6	16	6.5	.5	.3	0
North Dakota							27.9	+1.6									75	0.14	−0.6									5.8			
Fargo	940	5	43	28.93	29.98	−.09	27.5	+.4	61	15	38	−8	30	17	31	24	20	77	.28	−.6	5	12.7	nw.	39	se.	3	6	13	11	6.1	2.7	2.0	0
Bismarck [1]	1,677	4	41	28.15	29.99	−.08	29.8	+3.3	66	14	41	0	28	18	41	25	20	73	.08	−.5	3	9.3	nw.	31	nw.	3	9	7	11	12	5.9	.7	.0	0
Devils Lake	1,478	11	44	28.34	29.96	−.10	26.2	+1.7	61	14	37	−6	30	16	40	23	18	78	.08	−.6	3	8.6	nw.	25	se.	3	8	7	15	6.3	1.4	.5	0
Lemmon, S. Dak	2,602	4	38	27.21	29.97	----	31.3	----	71	15	43	9	28	20	38	26	22	76	.21	----	3	----	nw.	----	----	----	9	6	15	----	1.0	2.0	0
Grand Forks	832	11	71	29.04	29.98	----	24.0	----	54	15	35	−4	30	13	34	21	18	----	.33	----	3	----	nw.	----	----	----	6	12	12	----	3.1	.2	0
Williston	1,878	42	50	27.94	29.98	−.08	28.2	+1.0	60	14	38	1	29	19	32	24	19	73	.10	−.5	5	6.4	sw.	28	w.	16	10	9	11	5.6	.7	.0	0
Upper Mississippi Valley							41.5	+2.4									77	3.39	+1.4									6.8			
Minneapolis [1]-St. Paul, Minn	919	32	61	28.97	29.99	−.07	33.6	----	64	16	42	3	29	25	31	29	24	71	.27	−1.0	2	11.5	nw.	32	nw.	9	3	11	16	7.0	.9	.6	0
Springfield, Minn	1,025	4	42	28.86	29.99	----	33.0	----	65	15	44	−4	29	22	34	29	24	70	.35	----	4	----	nw.	----	----	----	7	11	12	----	4.0	2.6	0
La Crosse [2]	714	11	48	29.20	29.99	−.08	36.4	+1.2	64	16	44	5	29	29	30	31	27	78	2.68	+1.1	9	6.2	s.	21	w.	12	3	10	17	7.3	10.8	7.9	0
Madison [2]	974	70	78	28.93	30.01	−.05	36.8	+1.6	64	19	44	12	27	30	30	33	30	83	2.84	+1.1	14	10.3	nw.	27	s.	16	4	7	19	7.4	4.4	4.4	0
Charles City	1,015	10	51	28.90	30.02	−.06	35.1	+2.1	68	16	44	0	29	26	30	31	28	81	1.78	+.2	9	7.4	se.	23	s.	4	7	6	17	6.7	12.8	9.0	0
Davenport [2]	606	66	161	29.35	30.03	−.05	40.9	+1.9	76	19	49	14	26	33	34	36	33	79	3.20	+1.4	15	11.3	nw.	29	sw.	15	5	8	17	7.0	2.8	2.2	2
Des Moines [2]	860	5	99	29.05	29.99	−.09	40.4	+2.0	76	19	49	8	29	31	33	35	31	76	1.73	+.3	10	10.9	se.	29	sw.	16	8	5	17	6.6	4.8	1.5	0
Dubuque	699	60	79	29.24	30.01	−.06	38.9	+1.9	74	19	47	10	27	31	29	35	30	71	3.60	+1.9	14	7.2	nw.	21	se.	4	5	12	13	6.9	5.8	3.6	2
Burlington, Iowa	702	6	35	29.24	30.01	−.08	40.7	+.4	77	19	50	14	27	32	36	37	33	77	4.45	+2.4	14	11.0	s.	33	s.	15	7	6	17	6.8	4.9	3.8	4
Cairo	357	5	99	29.70	30.09	−.03	51.8	+4.5	78	19	60	28	27	44	29	----	----	----	5.23	+1.6	15	10.0	s.	29	sw.	9	8	8	14	6.3	.0	.0	3
Peoria [2]	609	11	45	29.47	30.03	−.06	41.4	+3.9	75	19	50	17	27	33	38	36	84	4.72	+2.4	14	7.1	s.	20	s.	16	7	8	15	6.5	3.2	3.1	2
Springfield, Ill. [2]	636	5	191	29.34	30.04	−.06	45.3	+3.1	76	19	53	21	27	37	29	39	37	83	5.82	+3.3	11	13.0	s.	35	s.	16	5	7	18	7.1	4.0	2.3	4
St. Louis [4]	568	179	303	29.43	30.04	−.06	49.0	+3.6	80	19	57	23	27	41	33	43	37	70	4.40	+1.6	12	14.5	sw.	44	sw.	16	10	7	13	5.8	T	T	2
Missouri Valley							41.0	+2.8									73	1.48	+0.1									6.0			
Columbia, Mo. [2]	784	6	66	29.17	30.02	−.07	47.6	+4.3	80	19	57	21	27	38	36	41	37	76	3.41	+1.2	14	9.2	s.	24	nw.	9	9	9	12	6.1	.7	.0	3
Kansas City [1]	963	38	76	28.96	30.01	−.08	46.8	----	77	19	56	18	29	38	39	42	37	73	2.74	+.9	12	12.1	sw.	40	sw.	16	9	4	17	6.5	.1	.0	4
St. Joseph [2]	967	11	49	28.96	30.01	----	45.0	+3.5	78	19	54	14	29	36	31	39	36	81	1.60	.0	9	10.1	s.	31	nw.	9	10	7	13	5.6	2.3	T	1
Springfield, Mo. [1]	1,324	5	60	28.62	30.04	−.06	48.2	----	77	18	58	20	27	39	35	43	39	77	4.43	+1.6	13	13.8	se.	38	s.	9	8	5	17	6.2	T	.0	5
Topeka	987	65	87	28.94	30.01	----	46.2	+3.4	79	19	56	18	29	36	37	41	36	73	1.33	−.2	12	10.5	s.	32	nw.	9	10	9	11	5.6	1.1	.0	1
Lincoln [3]	1,189	11	81	28.70	30.00	−.08	42.0	+2.9	73	19	53	7	29	31	35	35	30	70	.25	−.8	8	10.8	s.	31	nw.	9	10	10	10	5.4	.9	T	0
Omaha [1]	1,105	31	44	28.80	30.00	−.08	40.8	+2.5	72	19	51	7	29	30	37	36	31	72	.18	−.9	6	13.0	s.	38	s.	4	8	8	14	6.3	1.0	T	0
Valentine	2,598	46	54	27.22	29.99	−.09	36.2	+1.6	73	14	50	1	29	22	46	29	21	60	.28	−.3	4	8.7	w.	34	s.	3	6	13	11	5.9	2.5	1.7	0
Sioux City [1]	1,138	5	27	28.75	30.00	−.08	36.2	+2.2	68	15	49	0	29	23	41	32	26	71	.43	−.6	4	11.5	nw.	36	nw.	9	7	7	16	6.6	3.1	2.7	0
Huron [1]	1,306	5	41	28.57	30.00	−.08	33.6	+2.1	71	14	46	−1	29	21	46	28	24	75	.19	+.4	5	12.8	nw.	46	s.	3	10	9	11	5.4	1.1	.7	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	° *F.*	° *F.*	° *F*		° *F*	° *F*		° *F*	° *F*	° *F*	° *F*	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
Northern Slope							32.8	−0.3										72	1.29	+0.6										6.7			
Billings [1]	3,570	18	39	26.23	29.96	.....	34.9	−.5	65	23	44	11	28	26	28	30	23	65	1.09	.....	7	12.6	sw.	49	nw.	1	5	11	14	6.6	7.5	4.5	0
Havre	2,507	11	67	27.27	29.98	−.05	28.7	−2.5	65	13	39	0	29	18	39	25	20	75	.73	+.1	9	8.7	sw.	26	sw.	15	7	6	17	6.6	14.2	4.9	0
Helena [1]	4,124	5	35	25.72	30.04	−.06	30.8	−1.0	63	23	41	6	21	21	37	27	22	73	.87	+.1	9	8.6	w.	39	sw.	24	3	11	16	7.2	11.5	6.1	0
Missoula [2]	3,205	80	91	26.60	30.05	.....	34.0	+.5	51	14	41	14	21	28	25	30	28	85	1.41	+.2	17	5.6	se.	28	w.	24	1	7	22	8.5	12.1	5.5	0
Kalispell	2,973	48	56	26.87	30.00	−.07	29.6	−2.8	53	23	36	12	26	24	19	28	26	85	2.39	+1.0	15	4.9	nw.	20	sw.	24	1	4	25	8.9	22.1	6.6	0
Miles City [3]	2,371	48	55	27.44	29.99	−.08	33.2	+2.3	67	14	44	6	30	23	42	27	22	72	.37	−.2	8	5.8	s.	23	n.	1	7	7	16	6.2	2.4	2.0	1
Rapid City [2]	3,259	50	58	26.55	29.99	−.09	36.1	+.2	78	3	49	8	28	23	47	29	22	67	.38	−.1	5	13.0	nw.	46	nw.	9	7	9	14	6.0	1.8	.5	1
Cheyenne [1]	6,094	5	39	23.93	29.99	−.08	36.0	.....	68	15	49	3	21	23	37	29	21	58	1.91	+1.4	8	12.5	nw.	49	nw.	29	7	15	8	5.5	18.2	T	0
Lander	5,352	60	68	24.60	30.04	−.06	29.4	−.9	67	3	42	−5	22	17	42	26	21	72	2.35	+1.8	9	5.6	sw.	43	sw.	24	8	11	11	5.5	23.2	1.0	0
Sheridan [4]	3,790	6	42	26.03	30.00	.....	31.8	−.9	68	13	44	−5	21	20	41	27	22	76	2.23	+1.6	11	7.9	nw.	47	sw.	18	4	8	18	7.1	24.0	3.4	0
North Platte [2]	2,821	11	51	27.01	29.99	−.09	39.0	+2.4	71	15	52	2	29	26	42	30	24	69	.25	−.2	4	7.9	w.	25	nw.	9	9	11	10	5.7	1.7	T	0
Middle Slope							46.4	+3.1										65	0.58	−0.6									5.1			
Denver [1]	5,292	106	113	24.67	29.94	−.12	43.0	+5.2	78	15	57	15	29	29	44	32	20	49	.23	−.3	3	7.7	s.	31	nw.	25	12	12	6	4.5	2.8	.0	0
Pueblo [1]	4,690	5	36	25.24	29.97	−.08	42.8	+4.5	76	12	61	13	22	24	53	32	22	53	.07	−.3	1	7.9	w.	52	sw.	15	11	12	7	4.9	1.2	.0	0
Concordia	1,392	50	58	28.52	30.02	−.06	43.4	+2.0	78	19	54	7	29	32	42	37	32	68	.64	−.4	8	8.9	s.	30	nw.	9	10	8	12	5.8	2.9	T	0
Dodge City [1]	2,509	10	86	27.36	29.99	−.08	44.6	+2.0	82	19	58	8	29	31	41	36	31	70	.06	−.7	4	15.7	s.	46	n.	25	9	9	12	5.5	.1	.0	0
Wichita [1]	1,358	6	64	28.53	30.01	−.07	46.8	+2.0	77	18	57	18	29	36	33	41	37	75	.68	−.7	8	16.1	s.	45	s.	15	12	7	11	5.3	1.3	.0	0
Oklahoma City [2]	1,214	10	47	28.73	30.02	−.06	52.2	+3.4	80	16	63	20	29	41	37	45	40	69	.73	−1.1	5	11.1	s.	27	nw.	25	16	6	8	4.3	T	.0	1
Tulsa	674	10	61	29.29	30.02	.....	51.8	+2.9	79	20	62	24	30	41	36	46	42	73	1.62	−.5	8	13.2	s.	43	sw.	16	8	11	11	5.6	.0	.0	2
Southern Slope							55.9	+4.1										63	0.28	−0.8									3.7			
Abilene [2]	1,738	10	56	28.20	30.01	−.06	58.2	+4.7	84	9	70	28	29	46	39	49	44	68	.29	−1.1	3	11.4	s.	30	n.	9	15	8	7	3.9	.0	.0	0
Amarillo [2]	3,676	10	49	26.25	29.99	−.06	49.2	+3.7	81	18	64	17	29	34	44	40	34	66	T	−.9	0	15.8	sw.	46	sw.	15	15	10	5	4.0	.0	.0	0
Del Rio	960	63	71	29.02	30.01	−.04	63.4	+3.4	88	25	74	33	23	52	47	55	49	64	.83	−.4	3	8.8	se.	27	nw.	21	14	8	8	4.2	.0	.0	1
Roswell	3,566	75	85	26.38	30.00	−.03	52.8	+4.7	84	19	70	22	22	35	52	42	32	54	.00	−.8	0	7.2	s.	34	nw.	30	20	8	2	2.8	.0	.0	0
Southern Plateau							57.3	+4.2										42	T	−0.5									2.5			
El Paso [2]	3,778	82	101	26.20	29.98	−.02	58.1	+5.4	84	8	72	31	23	45	37	43	32	44	.00	−.5	0	7.7	w.	27	w.	30	18	9	3	2.7	.0	.0	0
Albuquerque [1]	5,314	5	45	24.75	29.98	.....	48.1	+4.8	71	8	62	24	22	34	36	38	26	46	T	−.5	0	8.3	n.	39	nw.	30	17	9	4	3.2	T	.0	0
Phoenix [2]	1,107	39	87	28.79	29.94	−.04	63.5	+3.8	88	10	79	36	21	48	40	48	38	50	.01	−.7	1	4.1	e.	22	w.	19	17	11	2	2.9	.0	.0	0
Tucson [1]	2,555	5	23	27.34	29.94	.....	63.2	.....	86	2	79	28	21	47	41	48	33	37	T	−.8	0	.....	se.	.....	.....	.....	21	7	2	2.4	.0	.0	0
Yuma	142	9	54	29.79	29.94	−.04	65.7	+3.3	90	14	81	41	20	51	37	51	38	42	.00	−.3	0	5.6	n.	23	w.	19	25	5	0	1.1	.0	.0	0
Independence	3,957	5	26	26.01	30.06	+.01	51.0	+3.8	78	3	66	23	21	36	39	38	24	36	T	−.3	0	.....	DI	.....	.....	.....	.....	.....	.....	.....	.....	.0	0
Middle Plateau							40.6	+1.6										61	0.90	+0.2									5.7			
Reno [2]	4,527	61	76	25.49	30.08	−.03	42.0	+.5	74	2	59	14	10	25	52	35	29	65	.96	+.3	5	7.6	sw.	52	sw.	14	7	10	13	5.9	.3	.0	0
Tonopah	6,090	9	20	24.05	30.03	.....	42.6	.....	66	2	52	18	20	33	33	35	25	52	.02	−.3	1	.....	se.	.....	.....	.....	15	9	6	.....	.4	.0	0
Winnemucca	4,339	5	56	25.65	30.08	−.06	39.8	+1.4	75	2	53	16	20	27	49	34	28	67	1.93	+1.2	9	9.0	sw.	52	sw.	15	6	10	14	6.4	1.6	.0	0
Modena	5,473	10	46	.....	30.08	.00	38.4	+2.0	71	2	53	5	21	24	.....	.....	.....	64	.67	+.1	2	9.7	sw.	43	sw.	3	15	8	7	.....	4.7	.0	0
Salt Lake City [1]	4,227	86	47	25.64	30.07	−.05	40.6	+1.2	69	2	51	21	26	30	36	35	29	68	1.68	+.5	12	10.0	se.	43	w.	29	8	6	16	6.2	1.8	.0	0
Grand Junction	4,602	60	68	25.41	30.02	−.06	42.4	+3.1	70	3	55	20	29	30	35	34	24	51	.13	−.4	3	5.9	nw.	42	sw.	3	11	14	5	4.3	T	.0	0
Northern Plateau							37.6	−0.8										79	2.50	+1.1									8.4			
Baker [2]	3,471	36	54	26.43	30.06	−.10	36.0	.0	55	2	44	14	20	28	29	32	29	80	1.51	+.5	15	6.3	se.	34	sw.	15	3	6	21	7.9	10.6	2.0	0
Boise [1]	2,739	5	49	27.19	30.07	−.10	39.6	−.1	64	2	48	23	20	31	28	36	33	76	2.31	+1.0	16	10.6	se.	47	nw.	15	4	7	19	7.4	.5	.0	1
Pocatello [1]	4,478	5	31	25.48	30.07	−.07	36.8	+2.7	65	3	46	16	11	28	34	32	28	76	2.18	+1.2	13	11.6	sw.	49	w.	15	5	5	20	7.5	1.3	.0	0
Spokane [1]	1,929	27	42	27.93	30.00	−.10	35.0	−3.5	53	23	41	12	30	29	24	34	31	84	2.69	+.6	17	6.7	sw.	34	sw.	14	0	4	26	9.3	7.2	3.5	0
Walla Walla	991	57	65	28.95	30.03	−.10	41.2	−1.6	67	23	47	24	28	35	26	.....	.....	.....	3.48	+1.5	14	6.2	s.	29	nw.	14	0	3	27	9.3	6.1	1.0	0
Yakima	1,076	58	67	28.85	30.02	.....	36.8	−2.1	56	1	42	24	19	31	22	34	31	79	2.86	+2.0	4	4.3	w.	28	w.	29	2	4	24	8.7	8.4	3.2	0
North Pacific Coast Region							46.0	+0.2										82	10.63	+4.2									8.2			
North Head	211	5	56	29.70	29.93	−.12	47.4	−.8	65	12	52	37	26	42	21	45	42	83	12.29	+3.8	24	16.5	se.	60	s.	2	3	7	20	7.7	.0	.0	1
Seattle [2]	125	90	321	29.80	29.94	−.10	45.6	.0	57	2	50	34	20	41	19	42	39	84	9.40	+4.4	20	10.8	se.	47	sw.	2	1	7	22	8.5	.0	.0	0
Tacoma	194	172	201	29.73	29.94	−.10	44.4	−.2	57	22	50	32	11	39	22	44	40	76	9.23	+3.0	19	8.9	s.	36	s.	2	1	10	19	7.8	.0	.0	0
Tatoosh Island	86	9	61	.....	29.88	−.09	45.2	−.7	57	13	49	38	5	42	.....	.....	.....	78	9.78	−2.2	22	19.3	e.	73	s.	2	1	11	18	.....	T	.0	0
Medford [1]	1,329	29	58	28.64	30.06	.....	44.8	+1.0	64	11	52	29	20	37	35	43	40	84	8.62	+6.1	20	.....	nw.	18	nw.	29	2	7	21	8.3	.0	.0	0
Portland, Oreg. [2]	154	68	106	29.81	29.98	−.12	46.4	−.4	60	23	51	34	20	42	18	43	42	89	14.40	+8.3	24	6.2	se.	23	s.	14	3	5	22	8.2	.0	.0	1
Roseburg	510	45	76	29.48	30.04	−.08	48.3	+2.4	68	22	55	32	20	41	28	46	43	82	10.68	+6.0	20	3.8	s.	23	sw.	16	0	7	23	8.6	.0	.0	1
Middle Pacific Coast Region							53.6	−0.1										73	5.28	+1.8									6.4			
Eureka	60	72	88	30.02	30.09	−.02	52.0	+.9	70	12	58	37	20	46	24	49	46	82	8.60	+3.4	19	6.5	se.	26	sw.	14	6	7	17	7.0	.0	.0	1
Redding [1]	722	20	34	29.29	30.07	.....	53.2	−.9	78	1	61	37	19	45	28	46	37	60	5.83	+1.5	13	7.5	nw.	36	se.	14	5	6	19	7.0	.0	.0	1
Sacramento [2]	66	92	115	30.00	30.08	−.01	53.4	−.2	76	1	63	36	20	44	31	48	44	74	2.22	+.3	9	6.5	n.	27	s.	17	9	11	10	5.8	.0	.0	0
San Francisco	155	112	132	29.90	30.07	−.02	56.0	−.3	75	12	62	46	19	50	24	51	47	75	4.45	+2.1	12	6.6	w.	26	w.	3	8	12	10	5.7	.0	.0	1
South Pacific Coast Region							59.0	+1.5										68	0.45	−0.5									4.4			
Fresno [1]	327	5	35	29.73	30.09	+.03	52.6	+.2	77	12	64	32	21	41	35	49	45	75	.84	−.1	4	4.0	nw.	26	nw.	15	8	7	15	6.1	.0	.0	0
Los Angeles	338	223	250	29.64	30.00	−.02	63.5	+2.6	90	11	74	45	20	53	31	52	44	57	.24	−1.0	4	6.2	ne.	24	sw.	19	19	7	4	3.2	.0	.0	0
San Diego [1]	87	20	55	29.91	30.00	−.02	61.0	+1.7	86	11	71	42	21	51	34	54	51	73	.27	−.5	3	5.0	w.	19	w.	19	16	7	7	3.9	.0	.0	0
West Indies																																	
San Juan, P. R.	82	10	54	29.73	29.81	.....	79.3	+.9	89	4	84	72	6	75	14	75	73	83	8.77	+2.0	21	9.9	ne.	35	e.	21	2	15	13	6.9	.0	.0	7

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
Panama Canal	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	° *F.*	° *F.*	° *F*		° *F*	° *F*		° *F*	° *F*	° *F*	° *F*	%	*In.*	*In.*		*Miles*							*0–10*	*In.*	*In.*	
Balboa Heights	118	6	92	[2] 29.82		0.00	79.3	+.2	92	21	86	71	13	73	19		[2] 91	8.41	−1.8	19	4.4	nw.	20	nw.	18	0	17	13	7.4	0.0	0.0	2
Cristobal	27	47	97	[2] 29.83		.00	80.8	+1.5	91	8	86	74	8	76	17	75	[2] 83	12.60	−9.7	24	6.7	w.	21	nw.	25	1	7	22	8.1	.0	.0	4
Alaska																																
Anchorage	135	36	47		[4] 29.72		15.8	−6.4	32	7	21	−8	27	10		13	10	82	.17	−.8	5	5.5	ne.	20	n.	18	9	4	17	2.1	1.0		0
Fairbanks	484	11	87		[4] 29.98		−6.4	−9.8	21	18	2	−41	26	−15				79	1.14	+.4	7	3.3	n.	25	w.	18	13	3	14	11.5	15.9		0
Juneau	132	96	116		[4] 29.71		31.4	−4.2	46	10	35	19	25	28		29	25	78	5.07	−4.0	18	7.7	w.	36	ne.	2	5	3	22	29.4	9.3		0
Nome	43	25	51		[4] 29.94		12.8	−3.0	34	1	19	−13	28	6				85	1.43	+.4	15	10.3	n.	41	n.	20	8	7	15	13.7	12.5		0
Hawaiian Islands																																
Honolulu	38	86	100	29.90	29.94		77.0	+2.5	85	3	82	67	30	72	13				3.86	.0	11	8.0	ne.	30	sw.	30	2	14	14	7.0	.0	.0	5
LATE REPORTS FOR OCTOBER 1942																																
Alaska																																
Bethel	22	5	32	[4] 29.58	[4] 29.62		30.2		59	1	36	14	15,	23	19	30	27	83	1.82		14		n.				4	6	21	7.7	4.1	.5	
Ketchikan	75	69	85	[4] 29.83	[4] 29.85		47.6		56	8	52	34	27	43	16	46	43	84	25.82		26	8.6	se.	34	se.	3	0	3	28	9.0	.0	.0	
McGrath	331	4	31	[4] 29.22	[4] 29.58		27.6		61	1	34	9	30	21	29	29	25	86	1.63		14		n.	20	ne.	13	2	7	22	8.2	13.0	5.0	
Nome	43	25	51	[4] 29.63	[4] 29.65		28.4		58	1	34	10	20	23	23	28	24	78	1.45		12	9.4	n.	29	se.	31	10	10	11	5.9	11.7	4.3	

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Barometric data from airport; other data from city office records.
[6] Wind, clear, partly cloudy and cloudy data from city office records; other data from airport.

NOTE.—Except as indicated by notes 1, 2, 5, and 6, data in table are city office records.

SEVERE LOCAL STORMS, NOVEMBER 1942

[Compiled by Mary O. Souder]

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Three Forks to Trident, Mont., and the Missouri Canyon North.	15	3–6 a. m.			$2,000	Straight-line wind	Damage principally to roofs and sheds.
Bush City to Parker, Kans., and vicinities.	16	6 p. m.	500		2,500	Tornado	Several barns and farm buildings damaged; path 15 miles long and not continuous.
Brookhaven, L. I.	25				10,000	Electrical	Poultry building burned.
LATE REPORTS FOR OCTOBER 1942							
Virginia, central and northern portions.	12–16			1		Torrential rains and floods.	Numerous highway and highway bridges washed away and about 1,300 persons made homeless in Albemarle, Spottsylvania, Stafford, and Warren Counties. Traffic of all kinds interrupted for 3 or 4 days. Loss in crops. In Madison County, 12.30 inches of rain fell in the 24 hours ending 4:30 p. m., on the 15th.
Paducah, Tex	14	4–4:30 p. m.	[1] 20–25		90,000	Straight-line wind	Damage to buildings, $3,000; loss in baled cotton, $87,000.
Ridgely and Keyser, W. Va.	14–15					Heavy rain and flood.	Several hundred families forced to evacuate their homes; considerable damage to dwellings and business places by the silt deposits. Shocked corn and stacked hay washed away. Much loss in apple crop from heavy dropping of fruit.
Cumberland, Md.,—Washington, D. C.	15–17	6 p. m., of 15–8 a. m., of 17.			227,440	Flood	The Potomac River flood reached Cumberland, Md., at 6 p. m., of the 15th; Hancock at 5 p. m., Williamsport at 8 p. m., and Harpers Ferry, W. Va., at 7 p. m., of the 16th and Washington, D. C., at 8 a. m., of the 17th. Several homes moved from their foundations, and 722 families forced from their homes. In Washington, D. C., 1.5 feet of water covered Maine Avenue along the water front for an hour. Slight damage occurred at the Navy Yard and hundreds of homes in Georgetown were flooded.
Mena, Ark	29	5:40 p. m.	100	0	15,000	Tornado	The tornado seemed to bounce along touching the ground at frequent intervals.
Randlett, Okla., vicinity of	29	6 p. m.	[1] 2		7,500	Hail	Loss in open cotton; path 8 miles long.
Oklahoma City, Okla., and vicinity.	29	8:21 p. m., C. S. T.			5,000	Straight-line wind	Property damaged.
Berryville, Ark	29	10:30 p. m.	880	29	500,000	Tornado	Over 100 persons injured and 600 homeless; about 137 homes and buildings destroyed and 65 damaged; path 1½ miles long.
Morrilton, Ark	29				5,000	Wind	Property damaged.
Meeker, Okla., 3½ miles west	30	9 p. m.	3	0		Tornado	Trees uprooted; window panes broken; a 6-room dwelling moved about 5 feet off its foundation; amount of loss not estimated.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR NOVEMBER 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, p. 20.

During late November the pyrheliometers at Ohio State University, Columbus, Ohio; and Michigan State College, East Lansing, Mich., were standardized by a representative of the bureau and records from both of these stations will be included in table 2 beginning with the first of the new year.

The work at Ohio State University is under the direction of Prof. N. F. Childers of the Department of Pomology and it is anticipated that valuable correlations will be obtained between radiation receipt and the ripening of fruits. The coordinates of the station are as follows:

Latitude, 39°58′ N., longitude, 83°0′ W., altitude, 810 feet.

The pyrheliometric equipment is owned and operated by the U. S. Soil Conservation Service, in cooperation with the Michigan Agricultural Experiment Station, under the direction of W. U. Garstka. The primary purpose of the solar observations is to correlate radiation receipt with run-off in hydrological studies. The coordinates of the station are as follows:

Latitude 42° 44′ N., longitude 84° 29′ W., altitude 810 feet.

Latitude, 41°46′ N., longitude, 70°40′ W., altitude, 878 feet.

Eppley pyrheliometers and Leeds and Northrup micromax potentiometers are used at both stations.

TABLE 1.—*Solar radiation intensities during November 1942*

[Gram-calories per Minute per Square Centimeter of Normal Surface]

MADISON, WIS.

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Nov. 3	2.87	.....	1.11	1.25	1.39	1.55	1.33	.....	.....	.....	3.15
Nov. 4	3.30	.....	.86	1.01	1.14	1.30	.....	.....	.....	.....	4.19
Nov. 6	3.02	0.80	1.04	1.13	1.33	1.54	.....	.....	.....	.....	3.81
Nov. 11	3.02	.91	1.03	1.19	.....	1.58	.....	.....	.....	.....	3.99
Nov. 13	2.74	.....	.....	1.21	.....	.....	.....	.....	.....	.....	2.16
Nov. 17	5.82	.90	.98	1.19	.....	.....	.....	.....	.....	.....	6.55
Means	.....	.87	1.00	1.16	1.29	1.49	(1.33)	.....	.....	.....	.....
Departures	.....	.00	+.01	+.01	−.02	−.04	−.01	.....	.....	.....	.....

TABLE 1.—*Solar radiation intensities during November 1942*

[Gram-calories per Minute per Square Centimeter of Normal Surface]

LINCOLN, NEBR.

Date	Sun's zenith distance										
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass									Local mean solar time
		A. M.					P. M.				
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Nov. 3	3.48	0.83	0.94	1.07	1.22	.....	1.22	1.05	0.90	0.81	3.81
Nov. 4	6.55	.....	.....	.....	.....	.....	1.14	.....	.....	.....	8.86
Nov. 5	3.81	.....	.....	.....	.....	.....	1.31	.....	.....	.....	3.81
Nov. 7	4.57	.....	.....	.....	.....	.....	.99	.62	.45	.37	[1] 5.38
Nov. 10	2.06	1.00	1.11	1.22	1.35	.....	.....	.....	.....	.....	2.87
Nov. 11	3.15	.94	1.07	1.18	1.36	.....	1.34	1.14	1.03	.....	3.63
Nov. 13	3.02	.....	.....	.....	.....	.....	1.22	1.12	1.00	.85	4.19
Nov. 14	3.48	.88	.98	1.14	1.29	.....	1.29	1.05	.88	.70	4.37
Nov. 17	2.62	.....	.....	.....	1.34	.....	1.34	.....	.....	.....	3.15
Nov. 18	3.15	.41	.62	.....	.....	.....	.....	.86	.64	.....	5.38
Nov. 24	3.30	.....	.....	.....	.....	.....	.....	1.17	1.06	.92	5.82
Nov. 26	2.16	.83	1.02	1.21	.....	.....	.....	1.24	1.11	1.05	3.30
Means	.....	.82	.96	1.16	1.31	.....	1.23	1.03	.88	.78	.....
Departures	.....	−.08	−.06	−.01	−.05	.....	−.11	−.14	−.15	−.14	.....

[1] Fairly heavy smoke throughout entire day.

ALBUQUERQUE, N. MEX.

Nov. 1	3.30	1.14	1.24	.....	1.41	1.56	1.39	1.27	1.17	1.08	3.63
Nov. 2	4.17	1.03	1.12	1.25	1.40	1.55	1.40	1.21	1.14	1.03	4.37
Nov. 3	4.75	.....	1.13	1.25	1.38	1.60	1.34	.....	.....	.....	4.75
Nov. 4	6.27	.89	1.04	1.21	1.37	.....	.....	.....	.....	.....	4.95
Nov. 5	5.36	.....	.....	.....	.....	.....	.....	1.19	1.05	.92	5.16
Nov. 6	4.95	.96	1.07	1.20	1.37	1.62	1.34	1.20	1.06	.95	5.36
Nov. 7	4.95	.97	1.06	1.21	1.36	.....	1.37	1.22	.....	.....	4.95
Nov. 8	4.17	1.01	1.14	1.22	1.37	1.64	1.41	1.27	1.14	1.04	4.57
Nov. 9	3.63	.....	1.13	1.19	1.29	1.53	1.42	1.33	1.18	1.08	3.81
Nov. 10	3.00	.....	1.11	1.24	1.40	1.64	1.35	.....	.....	.....	2.87
Nov. 11	2.87	.....	.....	.....	1.43	1.66	1.40	1.24	1.08	.94	3.00
Nov. 12	2.06	.....	.....	.....	.....	.....	1.42	1.29	1.18	1.07	2.49
Nov. 13	2.06	.....	1.19	1.31	.....	1.63	1.40	1.19	.....	.90	2.16
Nov. 14	2.06	1.01	1.12	1.21	.....	.....	.....	.....	.....	.....	3.63
Nov. 17	3.63	.....	.....	.....	.....	.....	.....	1.23	1.10	1.01	4.75
Nov. 18	3.99	.....	.....	.....	.....	.....	.....	1.26	1.10	.98	4.75
Nov. 20	2.87	.....	.....	.....	.....	.....	.....	1.31	1.23	1.16	3.15
Nov. 21	2.87	1.08	1.17	1.28	1.40	1.49	1.41	1.19	1.07	.95	3.00
Nov. 22	2.74	.....	1.20	1.33	.....	.....	.....	1.30	1.18	1.08	3.15
Nov. 23	2.87	1.05	1.16	1.26	1.33	.....	.....	1.27	1.16	1.05	3.30
Nov. 24	3.45	1.07	1.18	1.29	1.39	.....	1.42	1.25	1.11	.99	3.99
Nov. 25	3.00	1.06	1.16	1.25	1.35	.....	.....	.....	.....	.....	4.17
Nov. 26	2.74	1.11	1.17	1.28	1.40	.....	1.33	1.18	1.14	.92	3.00
Nov. 29	3.45	.99	1.12	1.24	1.37	.....	1.38	1.26	1.13	1.01	3.15
Means	.....	1.03	1.14	1.25	1.38	1.62	1.39	1.25	1.13	1.01	.....
Departures	.....	.00	.00	−.01	.01	−.00	−.01	.00	.00	−.01	.....

*Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	Chicago	New York	Cambridge	Nashville	Twin Falls	New Orleans	Riverside	Blue Hill	Friday Harbor	Ithaca	Newport	State College	Put-in-Bay	San Juan u. v. below 3132 Å	East Wareham	Davis, Calif.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*milli-cal.*	*cal.*	*cal.*
Oct. 29	274	60	94	50	245	235	5	165	379	402	268	278	202	258	153	50	171	268	275
30	313	67	166	91	219	273	194	279	346	366	281	76	251	311	270	116	192	311	325
31	252	316	305	227	193	283	6	131	.....	384	268	56	119	156	166	74	199	163	363
Nov. 1	263	50	240	86	109	101	244	112	.....	370	90	204	127	96	259	304	200	73	370
2	300	136	279	105	276	287	254	244	.....	352	295	150	168	307	179	170	341	302	333
3	262	293	310	220	191	20	270	40	.....	351	15	221	119	31	94	117	157	24	282
4	361	224	209	259	314	314	309	228	276	362	330	155	338	328	292	272	136	318	365
Mean	**289**	**164**	**229**	**149**	**221**	**216**	**183**	**171**	.....	**369**	**221**	**163**	**189**	**212**	**202**	**158**	**206**	**210**	**330**
Departure	**+43**	**−21**	**−5**	**−11**	**+8**	**+19**	.....	**−42**	.....	**+58**	**+2**	**+25**	**+31**	**−15**	**+33**	.....	.....	.....	.....
5	255	39	282	18	169	225	44	197	333	349	298	258	268	275	244	60	.....	312	341
6	97	216	150	163	83	107	15	252	402	339	118	30	27	154	32	262	209	136	325
7	131	156	243	212	211	216	31	129	408	315	232	227	289	220	259	242	274	211	312
8	218	154	47	155	78	61	69	54	400	336	79	88	170	130	24	167	346	136	81
9	221	20	56	15	233	230	223	259	362	336	254	48	289	282	158	83	267	287	342
10	55	183	290	39	86	136	197	266	280	350	130	207	46	89	52	76	255	118	329
11	300	266	288	247	256	176	232	285	442	325	188	196	108	268	144	174	276	217	291
Mean	**182**	**148**	**194**	**121**	**160**	**164**	**116**	**206**	**375**	**336**	**186**	**150**	**171**	**203**	**130**	**152**	**271**	**202**	**289**
Departure	**−41**	**−17**	**−38**	**−18**	**−27**	**−6**	.....	**−3**	**+71**	**+36**	**−9**	**+32**	**+17**	**−15**	**−18**	.....	.....	.....	.....
12	270	221	286	220	241	151	272	266	434	324	181	206	143	194	198	71	194	182	310
13	248	268	275	222	102	159	257	244	.....	305	161	21	124	146	115	110	276	116	202
14	292	240	274	210	270	228	256	90	.....	305	237	13	221	278	267	248	266	284	124
15	279	174	226	207	252	267	309	174	.....	111	277	133	271	282	254	248	219	297	285
16	276	76	214	131	192	188	265	140	307	297	198	35	227	230	214	232	238	217	65
17	261	160	233	100	170	201	256	29	121	310	204	133	141	224	121	34	158	230	50
18	204	206	226	155	204	80	216	76	.....	236	66	33	203	90	218	259	184	50	187
Mean	**261**	**192**	**248**	**178**	**204**	**182**	**262**	**146**	.....	**270**	**189**	**82**	**190**	**206**	**198**	**172**	**231**	**197**	**175**
Departure	**+60**	**+39**	**+37**	**+50**	**+55**	**+15**	.....	**−20**	.....	**−10**	**+30**	**−8**	**+76**	**+15**	**+43**	.....	.....	.....	.....
19	253	40	234	168	195	243	266	120	290	257	243	80	206	258	211	96	188	260	286
20	223	10	12	31	174	90	278	240	283	309	124	72	30	167	160	119	197	159	302
21	90	105	36	47	24	15	158	249	.....	323	8	80	24	13	30	55	.....	26	244
22	138	77	64	71	251	252	48	168	.....	302	243	45	238	239	231	131	173	238	268
23	42	65	226	15	93	214	42	205	389	291	240	126	146	245	17	23	.....	268	263
24	45	92	235	45	16	22	13	31	398	285	15	71	46	14	26	74	133	13	242
25	140	144	62	191	40	17	263	201	309	285	20	.....	26	11	12	142	78	19	277
Mean	**133**	**76**	**124**	**81**	**113**	**122**	**153**	**174**	**334**	**293**	**128**	**79**	**102**	**135**	**98**	**91**	**154**	**141**	**269**
Departure	**−50**	**−54**	**−73**	**−41**	**−27**	**−20**	.....	**+12**	**+80**	**+17**	**−23**	**−23**	**−21**	**−24**	**−37**	.....	.....	.....	.....
26	207	197	254	194	89	40	192	88	.....	284	34	28	157	49	95	58	144	69	239
27	283	132	85	189	233	23	294	71	.....	112	16	158	106	36	141	51	64	20	38
28	225	76	35	70	206	139	226	180	.....	250	186	41	202	234	95	73	.....	220	93
29	51	155	262	24	57	79	25	34	.....	270	82	82	30	75	20	26	.....	95	64
30	207	50	130	40	161	171	157	152	160	243	177	73	139	158	197	153	77	166	106
Dec. 1	45	217	131	117	10	63	7	53	299	272	80	24	24	87	8	16	97	93	234
2	134	225	214	209	160	112	198	166	360	260	80	147	76	126	129	120	187	70	173
Mean	**165**	**150**	**159**	**120**	**131**	**90**	**157**	**106**	.....	**242**	**94**	**79**	**105**	**109**	**98**	**71**	**116**	**105**	**135**
Departure	**−1**	**+24**	**−22**	**+21**	**+3**	**−47**	.....	**−45**	.....	**−8**	**−61**	**−5**	**+14**	**−55**	**−16**	.....	.....	.....	.....

ACCUMULATED DEPARTURES ON DECEMBER 2, 1942

	+357	**−3178**	**−9457**	**+4690**	**−3500**	**−5271**	.....	**+1400**	.....	**+11228**	**−11088**	**−1057**	**−686**	**−5614**	.....	.....	.....	.....	.....

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR NOVEMBER 1942

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Nov. 1	12 25	7510	−43	145	−13	46	24	1	G	U. S. Naval.
		7508	−16	172	−10	22	436	15		
		7508	−11	177	−11	18	97	10		
		7507	−8	180	−12	18	218	1		
		7505	+59	247	−7	60	48	1		
				(188)	(+4)		823	28		
Nov. 2	11 3	7510	−30	146	−13	34	12	1	G	Do.
		7508	−3	173	−10	13	436	15		
		7508	+3	179	−11	15	97	7		
		7507	+4	180	−12	16	218	1		
		7511	+42	218	−2	43	97	6		
		7505	+73	249	−8	73	24	1		
				(176)	(+4)		884	31		
Nov. 3	10 34	7508	+10	173	−10	17	485	23	VG	Do.
		7508	+15	178	−11	21	97	7		
		7507	+17	180	−12	23	194	1		
		7511	+55	218	−2	55	97	5		
		7505	+85	248	−8	85	24	1		
				(163)	(+4)		897	37		
Nov. 4	12 33	7508	+24	172	−10	28	436	15	G	Do.
		7508	+28	176	−11	31	73	3		
		7507	+30	178	−12	33	194	1		
		7511	+69	217	−2	69	24	2		
				(148)	(+4)		727	21		
Nov. 5	10 33	7512	+8	144	−14	20	48	5	G	Do.
		7508	+38	174	−11	41	436	13		
		7508	+42	178	−12	45	73	1		
		7507	+44	180	−13	48	194	1		
				(136)	(+4)		751	20		
Nov. 6	10 34	7513	−78	45	−13	79	48	1	G	Mt. Wilson.
		7508	+52	175	−10	54	436	19		
		7508	+57	180	−11	59	48	1		
		7507	+59	182	−13	61	194	1		
				(123)	(+4)		726	22		
Nov. 7	10 25	7513	−65	45	−12	66	73	1	F	U. S. Naval.
		7508	+66	176	−10	67	242	4		
		7508	+66	176	−12	68	194	2		
		7507	+71	181	−13	72	194	1		
				(110)	(+4)		703	8		
Nov. 8	10 41	7513	−51	45	−12	54	73	1	G	Mt. Wilson.
		7508	+80	176	−10	80	242	4		
		7508	+80	176	−10	80	194	1		
		7507	+85	181	−11	85	194	1		
				(96)	(+4)		703	7		
Nov. 9	10 57	7513	−38	45	−13	41	73	1	F	U. S. Naval.
		7515	−13	70	+12	21	24	1		
		7514	−8	75	−12	18	24	2		
				(83)	(+4)		121	4		
Nov. 10	10 53	7513	−25	45	−12	28	48	1	G	Mt. Wilson.
		7513	+1	71	+12	9	12	2		
		7514	+4	74	−12	15	97	11		
				(70)	(+3)		157	14		
Nov. 11	10 48	7513	−12	45	−12	19	48	1	F	U. S. Naval.
		7514	+19	76	−12	24	97	9		
				(57)	(+3)		145	10		
Nov. 12	10 58	7513	+1	45	−12	15	48	1	F	Do.
		7514	+33	77	−13	37	145	11		
				(44)	(+3)		193	12		
Nov. 13	10 56	7513	+15	46	−12	21	48	1	F	Do.
		7514	+47	78	−12	51	194	1		
				(31)	(+3)		242	2		
Nov. 14	10 20	7513	+28	46	−12	32	24	1	G	Do.
		7514	+59	77	−13	61	97	4		
		7514	+61	79	−12	63	194	1		
				(18)	(+3)		315	6		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR NOVEMBER 1942—Continued

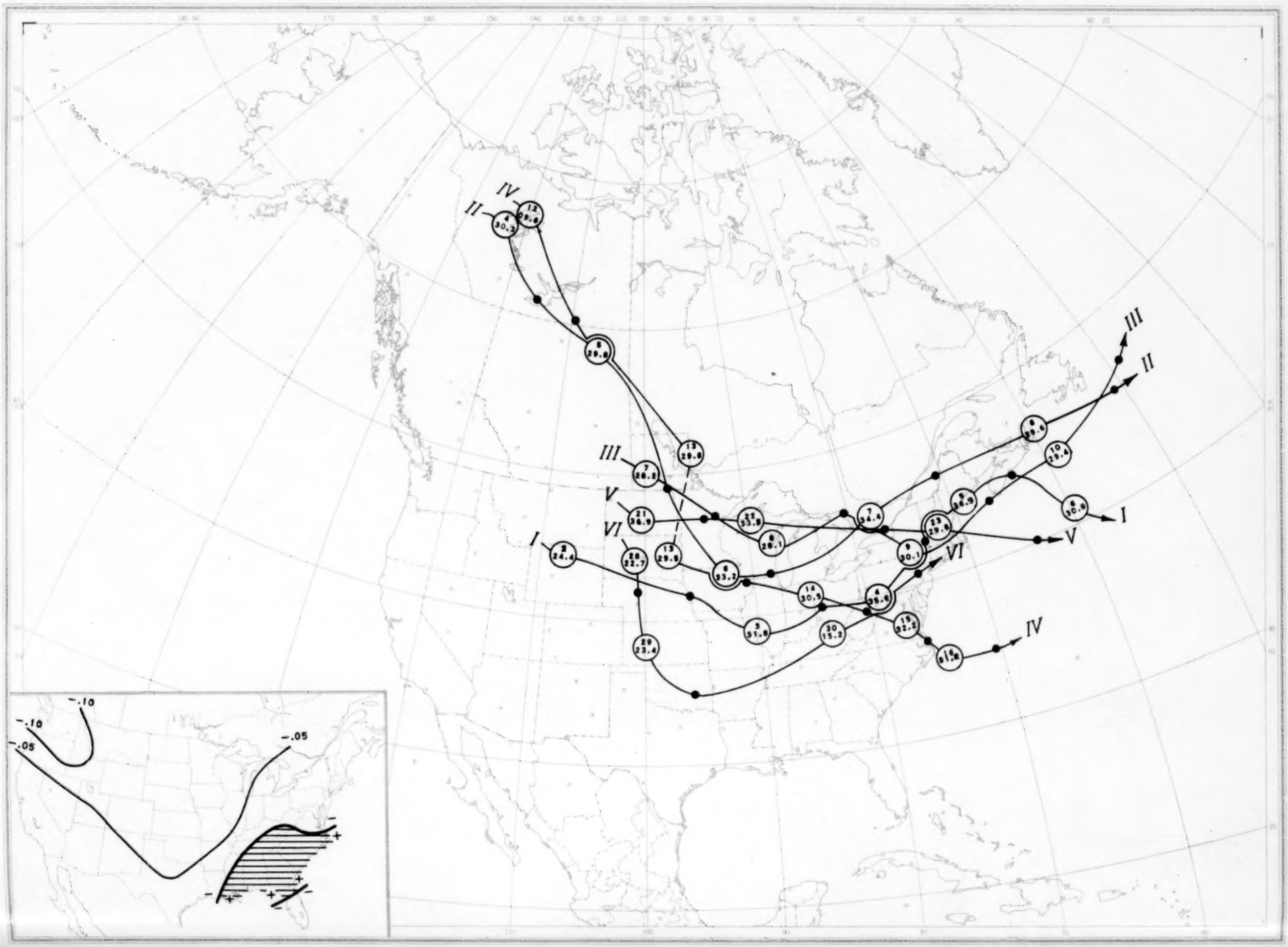
Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	h m		°	°	°	°				
Nov. 15	12 15	7514	+71	74	−13	73	145	2	F	Do.
		7514	+76	79	−12	77	194	1		
				(3)	(+3)		339	3		
Nov. 16	10 57	.....	.....	No	spots	.....	.....	.....	G	Mt. Wilson.
Nov. 17	11 0	.....	.....	No	spots	.....	.....	.....	G	U. S. Naval.
Nov. 18	11 50	.....	.....	No	spots	.....	.....	.....	G	Mt. Wilson.
Nov. 19	10 56	.....	.....	No	spots	.....	.....	.....	G	U. S. Naval.
Nov. 20	11 20	7516	+22	320	−1	23	36	1	G	Mt. Wilson.
				(298)	(+2)		36	1		
Nov. 21	11 30	7518	−85	200	+9	85	194	1	VG	Do.
		7517	−32	253	−8	34	73	10		
		7516	+36	321	−1	36	61	13		
				(285)	(+2)		328	24		
Nov. 22	12 24	7518	−71	200	+9	71	436	7	F	Do.
		7517	−16	255	−8	18	73	8		
		7516	+51	322	−1	51	48	10		
				(271)	(+2)		557	25		
Nov. 23	11 45	7519	−79	179	−13	80	48	1	G	Do.
		7518	−56	202	+9	57	582	10		
		7517	−4	254	−8	11	97	19		
		7516	+63	321	−1	63	24	5		
				(258)	(+2)		751	35		
Nov. 24	11 15	7519	−68	177	−15	70	24	7	G	Do.
		7519	−65	180	−8	66	24	4		
		7519	−65	180	−14	67	121	1		
		7518	−42	203	+9	43	630	18		
		7517	+10	255	−8	14	97	15		
				(245)	(+2)		896	45		
Nov. 25	11 28	7520	−55	177	−2	55	12	3	G	U. S. Naval.
		7519	−55	177	−15	58	12	3		
		7519	−51	181	−11	42	73	1		
		7518	−32	200	+10	33	727	13		
		7517	+24	256	−9	27	73	5		
				(232)	(+2)		897	25		
Nov. 26	10 9	7520	−43	177	−3	43	24	5	F	Do.
		7521	−42	178	−10	43	6	1		
		7519	−39	181	−12	41	97	1		
		7522	−30	190	−7	31	12	2		
		7518	−18	202	+10	20	727	13		
		7517	+38	258	−9	39	24	1		
				(220)	(+1)		890	23		
Nov. 27	11 52	7521	−34	171	−9	36	24	5	G	Mt. Wilson.
		7520	−29	176	−3	30	12	3		
		7519	−27	178	−11	30	97	1		
		7522	−18	187	−8	21	24	4		
		7518	−5	200	+9	10	727	13		
		7523	+12	217	−2	13	12	1		
		7517	+48	253	−9	50	48	5		
				(205)	(+1)		944	32		
Nov. 28	10 9	7521	−22	171	−10	24	24	6	G	U. S. Naval.
		7519	−13	180	−11	18	73	3		
		7522	−6	187	−8	11	24	5		
		7518	+9	202	+9	12	727	15		
				(193)	(+1)		848	29		
Nov. 29	10 42	7524	−8	172	−8	13	145	8	F	Mt. Wilson.
		7519	0	180	−12	13	24	3		
		7522	+8	188	−9	13	24	3		
		7518	+23	203	+8	24	679	13		
				(180)	(+1)		872	27		
Nov. 30	11 1	7525	−79	87	−11	79	291	4	G	U. S. Naval.
		7524	+7	173	−7	11	436	18		
		7519	+12	178	−15	20	61	1		
		7519	+13	179	−12	18	36	3		
		7518	+37	203	+8	38	582	13		
				(166)	(+1)		1,406	39		

Mean daily area for 30 days = 538.

*Not numbered.
VG = very good; G = good; F = fair; P = poor.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, November 1942

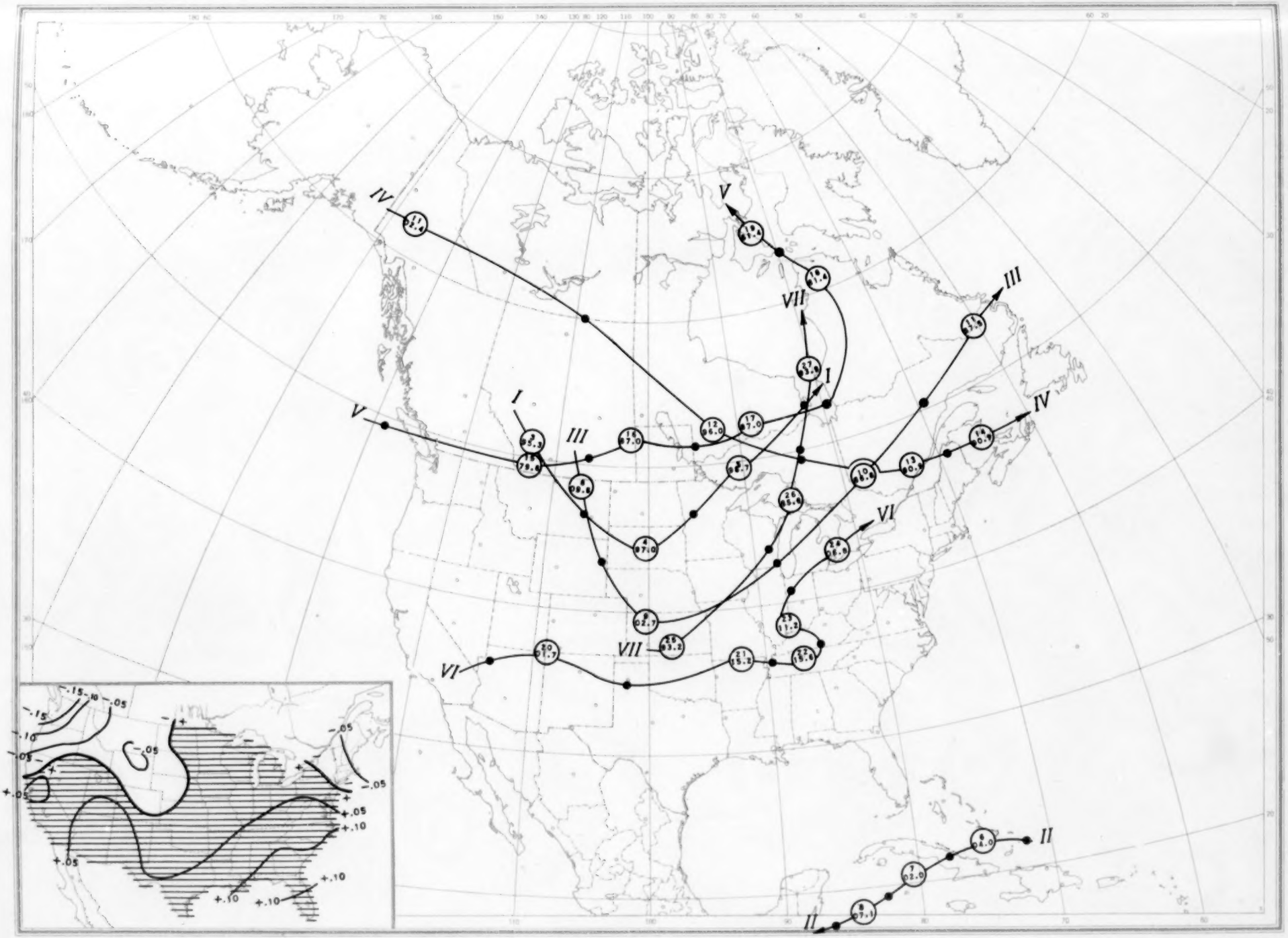
Chart II. Tracks of Centers of Anticyclones, November 1942. (Inset) **Departure of Monthly Mean Pressure from Normal**



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, November 1942. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, November 1942

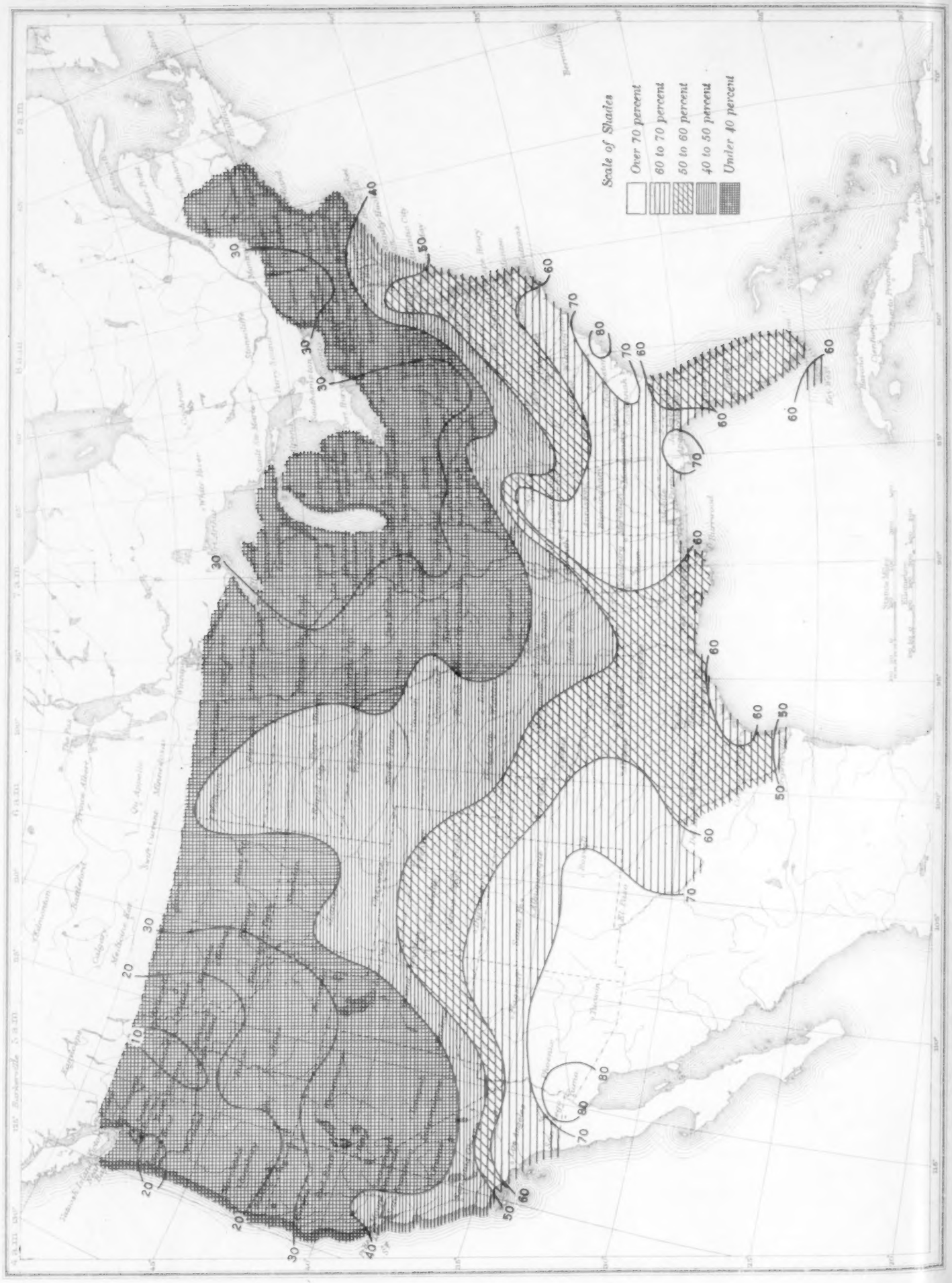


Chart V. Total Precipitation, Inches, November 1942. (Inset) Departure of Precipitation from Normal

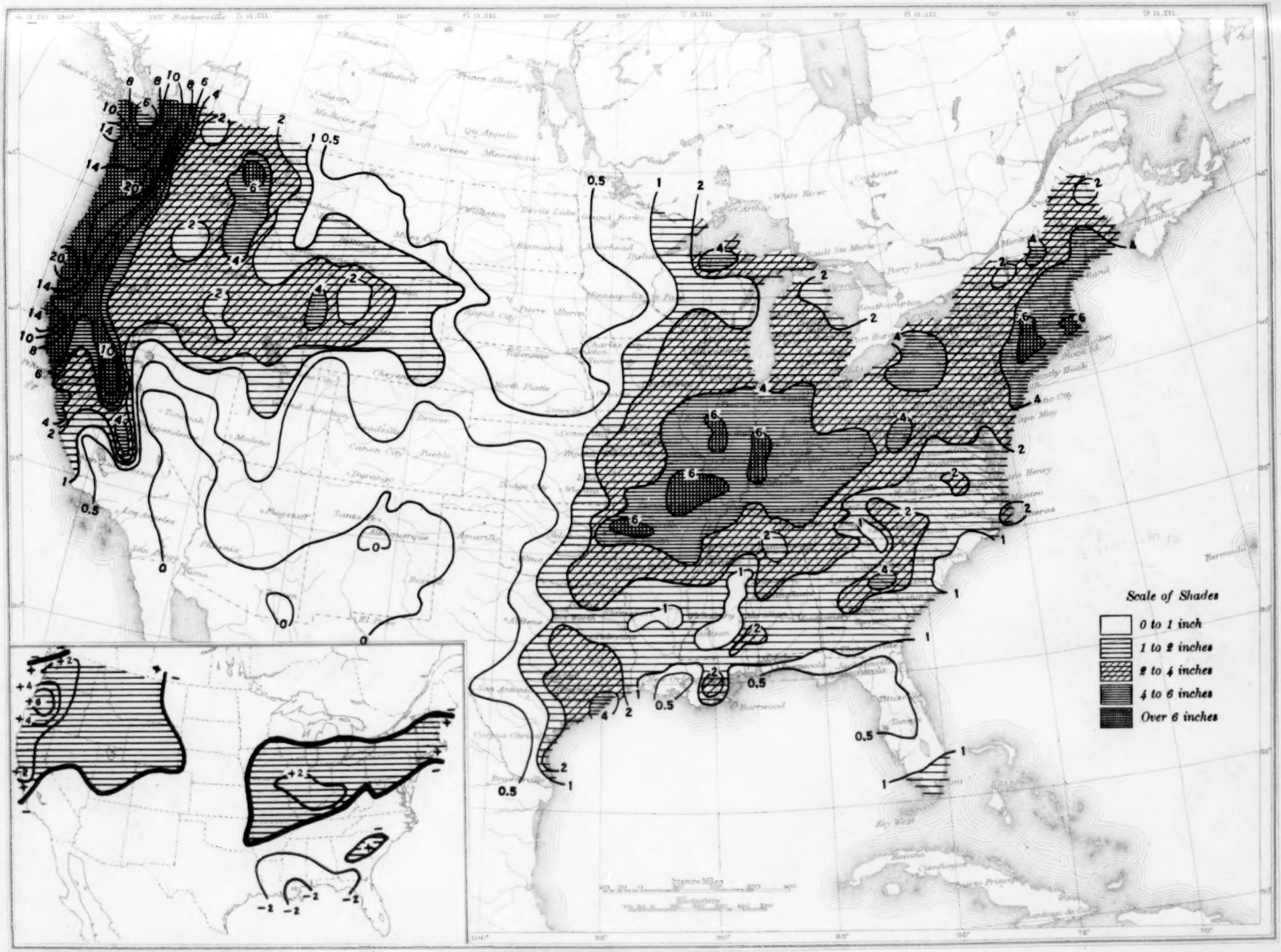


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, November 1942

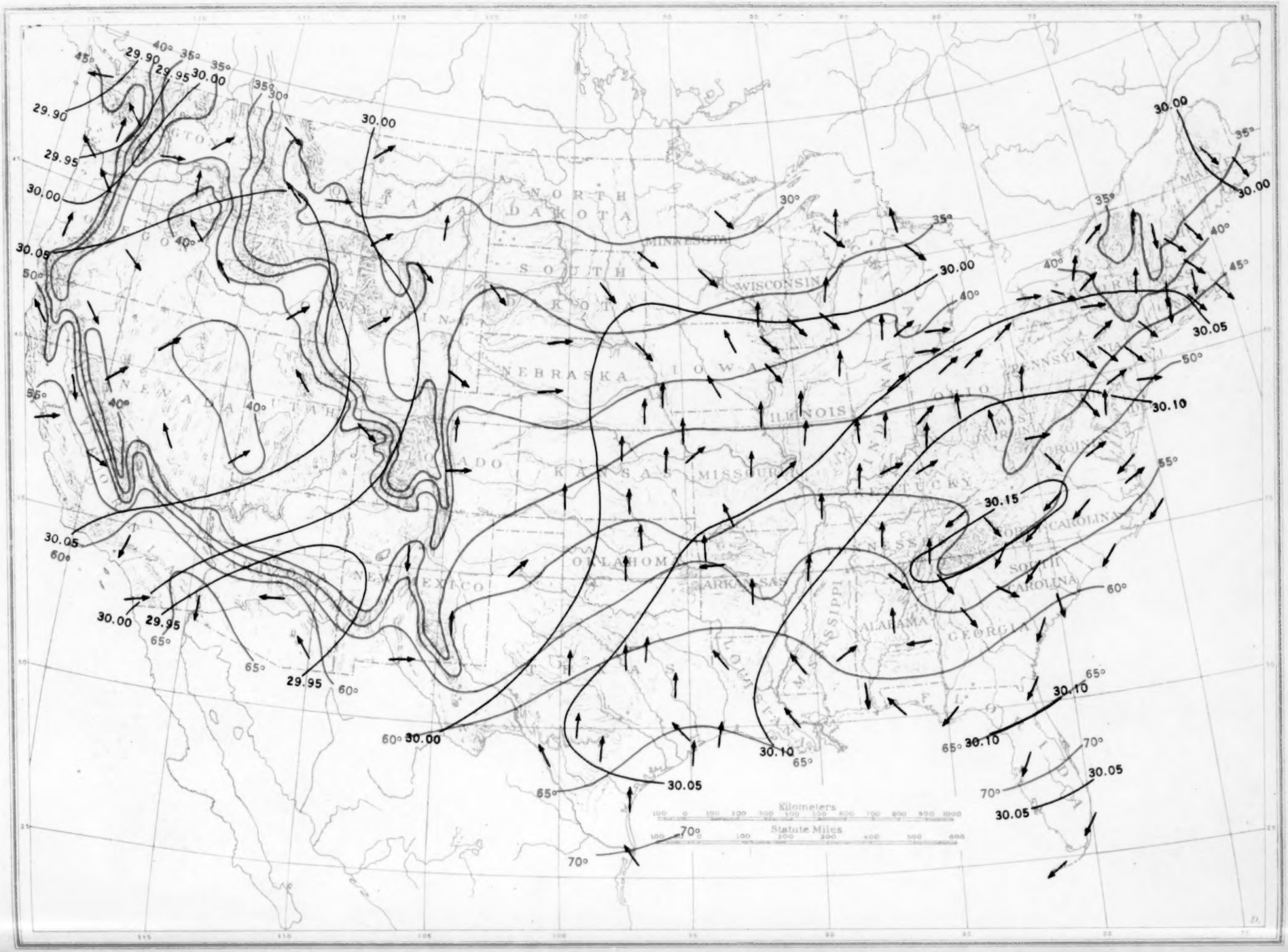


Chart VII. Total Snowfall, Inches, March 1942.

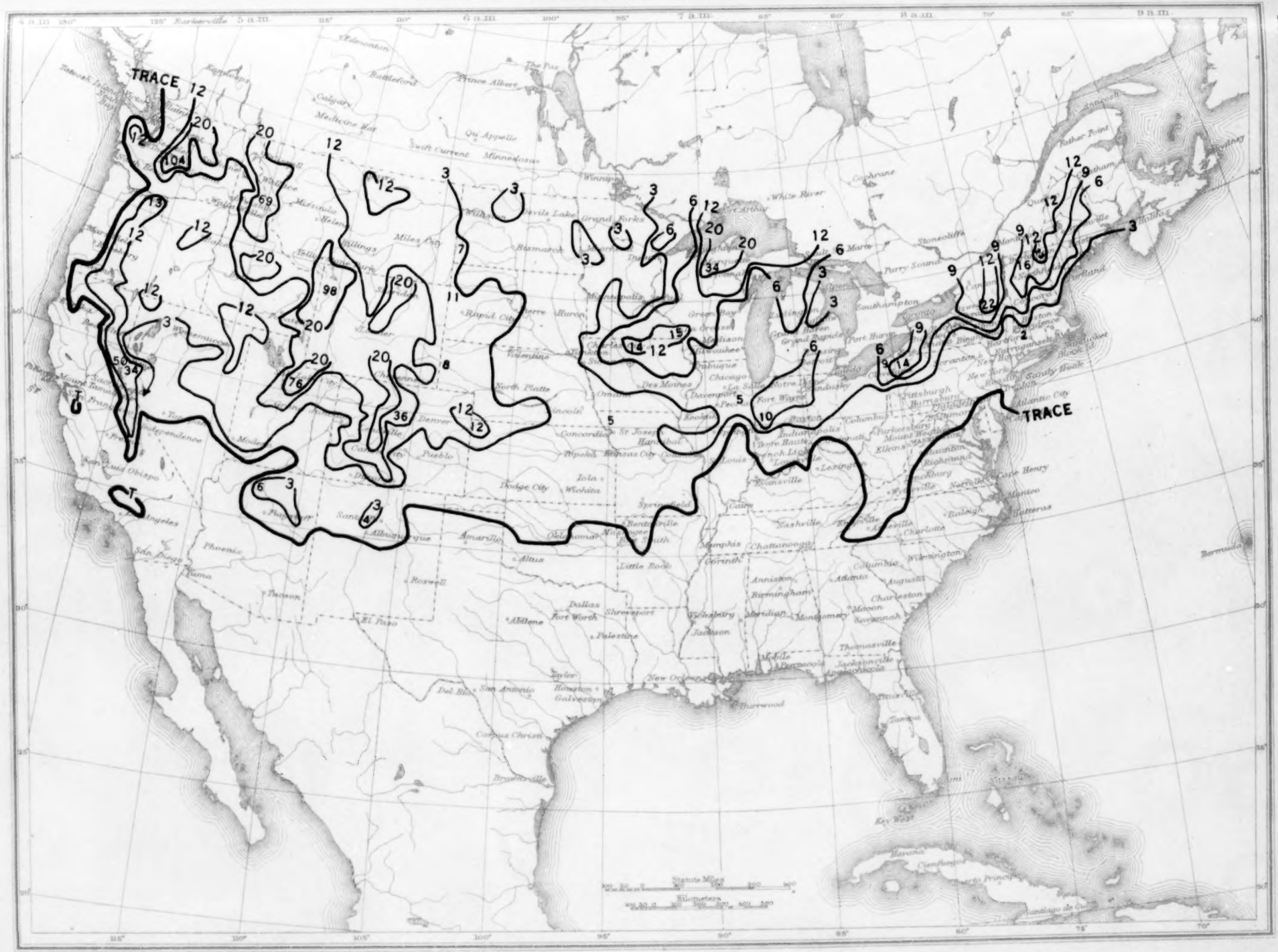


Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) November 1942

Isobars and isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

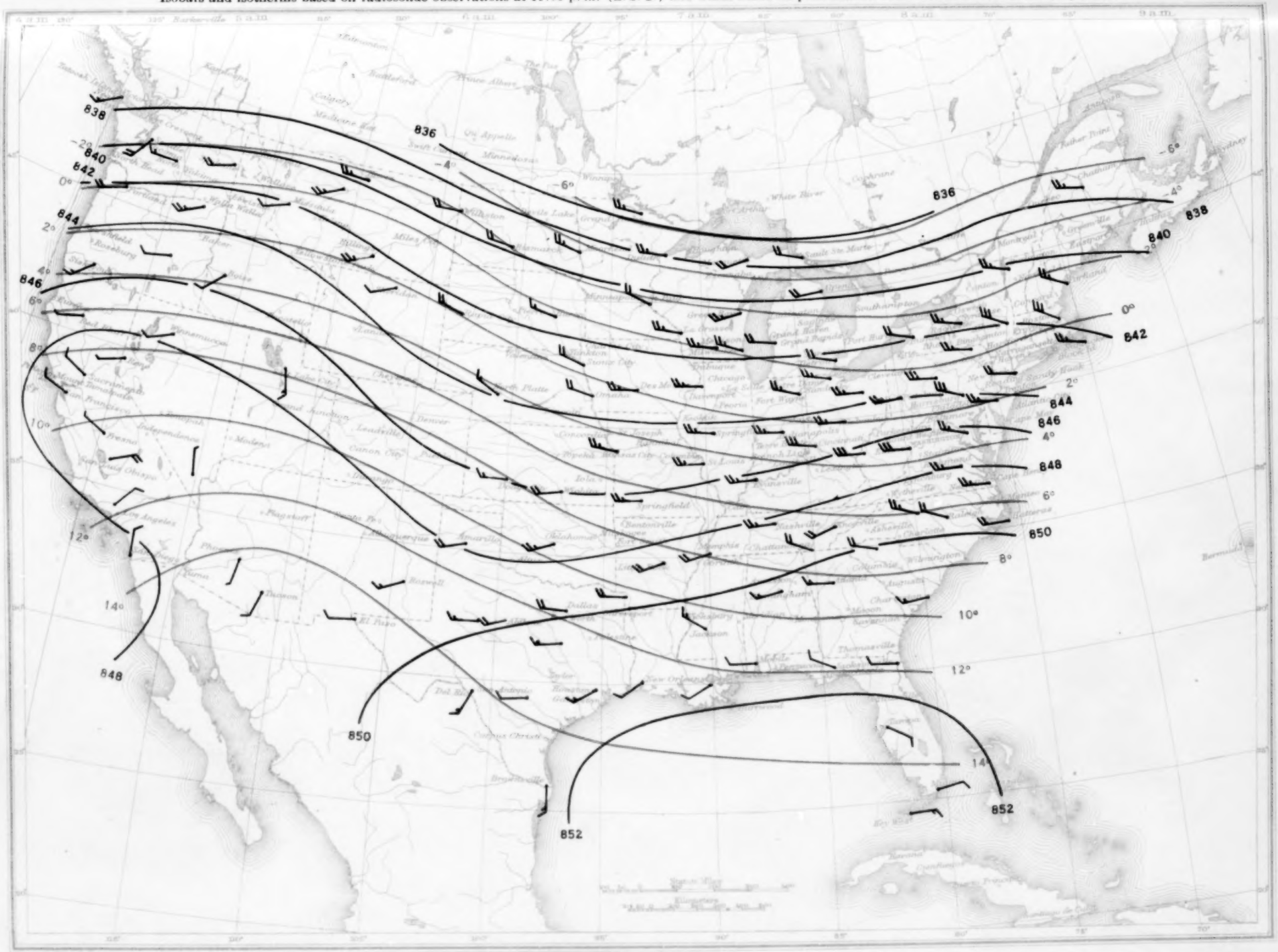


Chart IX. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) November 1942

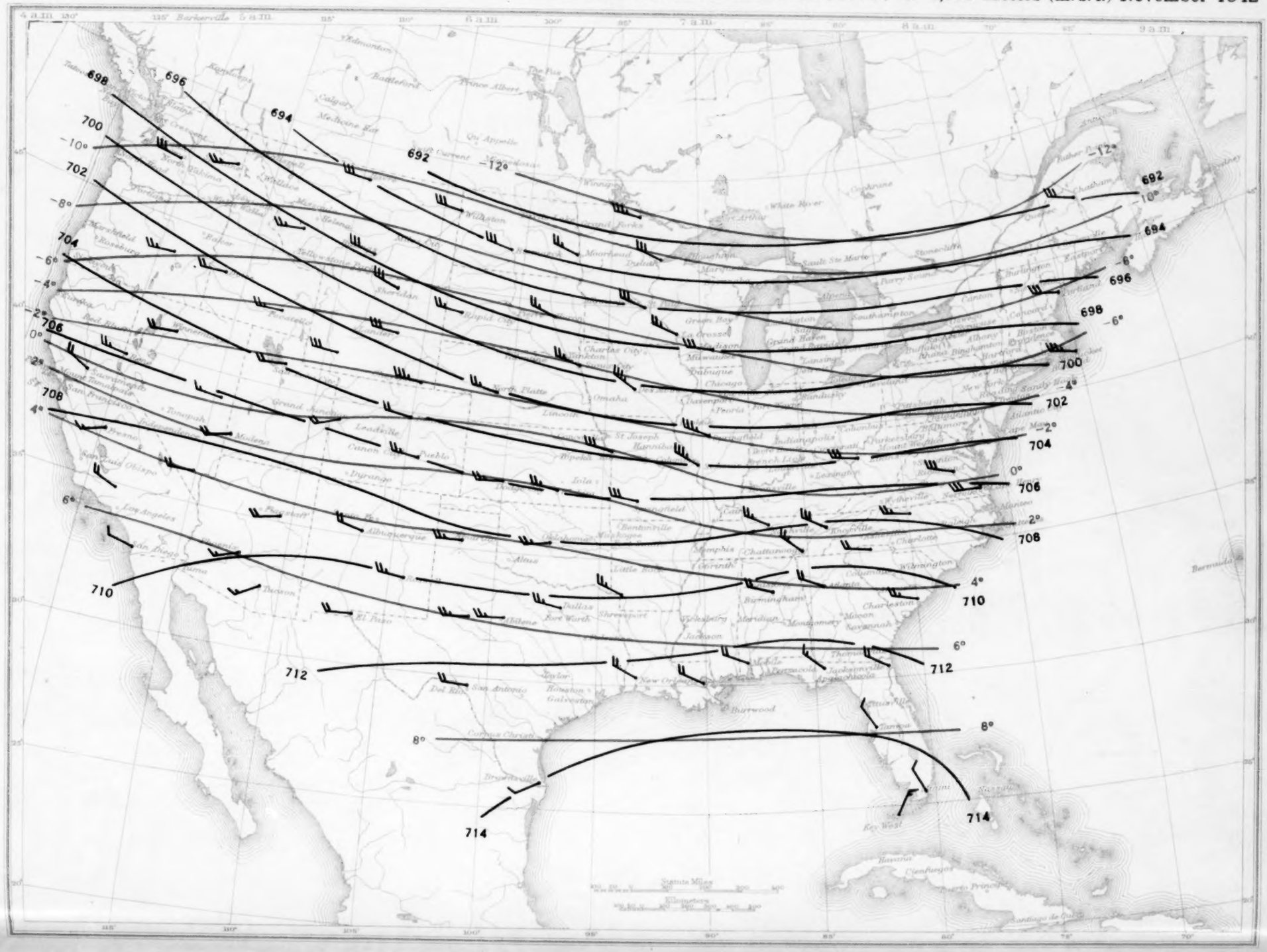


Chart X. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) November 1942

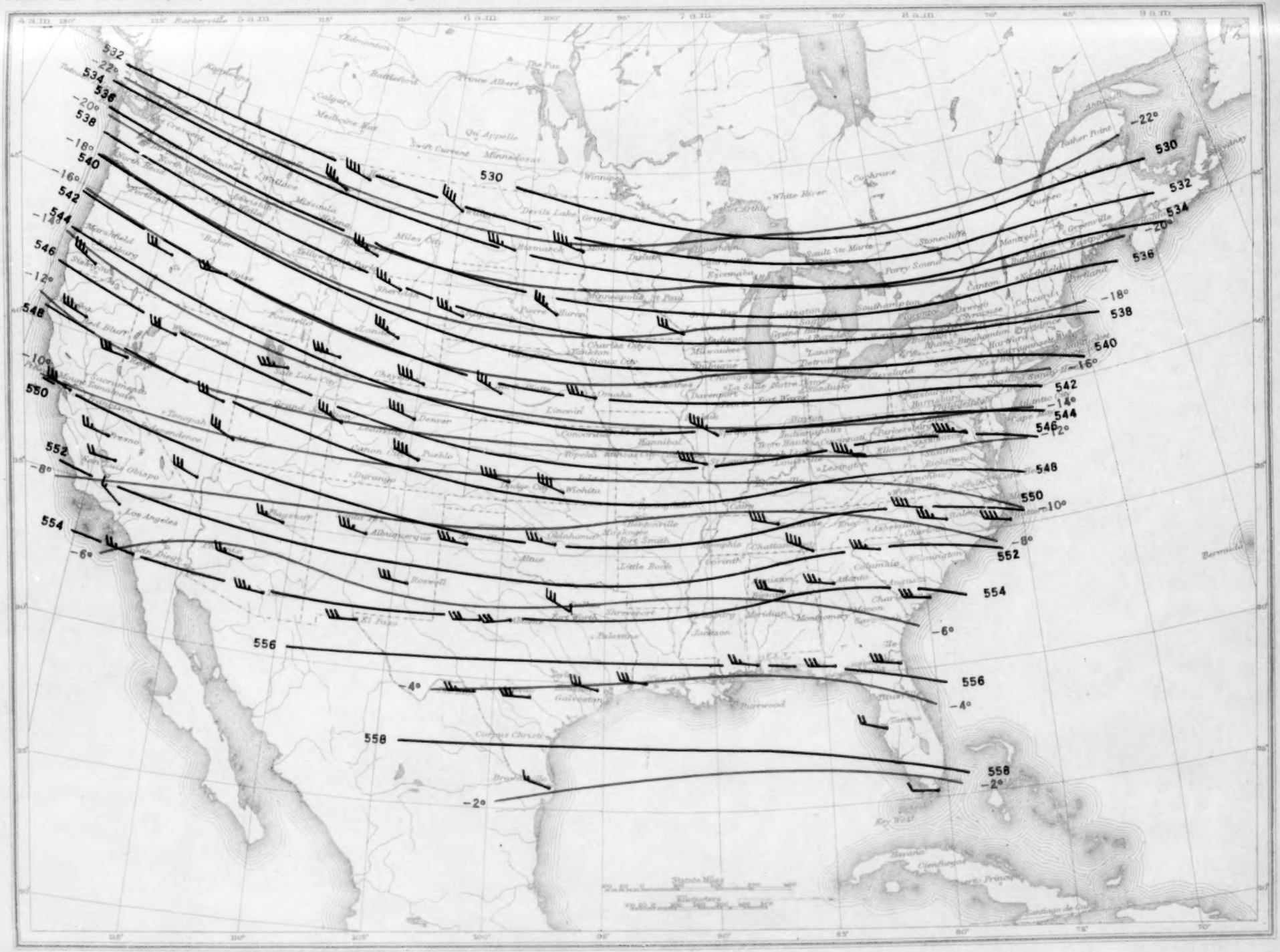
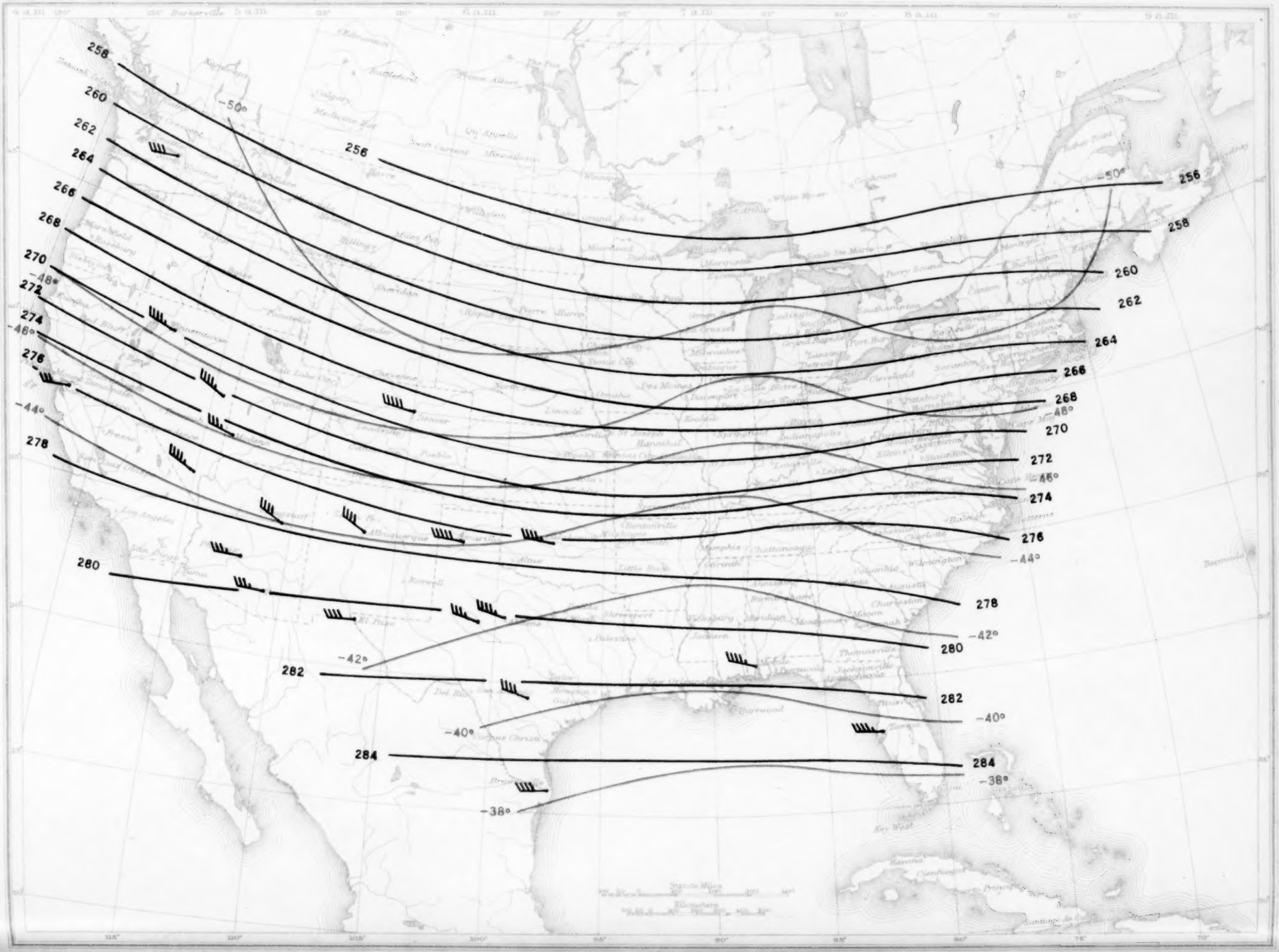



Chart XI. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) November 1942